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ABSTRACT

Contained in this document are translations of military interest concerning the Union of Soviet Socialist Republics. The following specific items are included: (1) technical training methods, (2) the constantly improving party direction of administrative organs, (3) college for armed forces personnel, (4) development of Leninist principles in military organizational development in the CPSU program, (5) application of the programed teaching method in training navy specialists, (6) notes from cosmonaut flight logs, (7) physics and new weapons, and (8) conference on programed teaching. (EMH)

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This serial publication contains translations of military interest concerning the USSR, on subjects reflected in the table of contents. Complete bibliographic information accompanies each article.

TABLE OF CONTENTS

Page

New Specialist Training Methods.......................... 1

Constantly Improving Party Direction of Administrative Organs.......................... 10

College for Armed Forces Personnel.......................... 18

Development of Leninist Principles in Military Organizational Development in the CPSU Program.......................... 25

Application of the Programmed Teaching Method in Training Navy Specialists.......................... 37

Notes from Cosmonaut Flight Logs.......................... 45

Physics and New Weapons.......................... 52

Conference on Programmed Teaching.......................... 59

NEW SPECIALIST TRAINING METHODS

[Following is the translation of an article by Engineer Capt Lt V. N. Kal'nik, Capt 3rd Rnk A. G. Leybovich and Capt 2nd Rnk G. S. Sarantsev in the Russian-language journal Morskoy Sbornik (Naval Review), No 10, October 1963, pages 14-20.]

In spite of sharp advances in industry, farming, transport and the Armed Forces, extensive mechanization and automation of various processes in man's activities, the part played by man in executing these processes is not only not being reduced but on the contrary is being expanded. This is due to the fact that man is becoming more and more a creative worker surrounded by mechanical assistants. Under conditions of constantly increasing complexity of equipment, demands are made on man not only for physical strength, endurance and a certain sum total of skills, but also profound knowledge and ability, that is the genuine skill of a specialist, well-trained and practiced. At the same time an increase in specialist training programs increases the length of the training schedule and lessens its quality. Therefore in our time the problem of choosing appropriate methods for specialist training has become a universally critical one. This problem directly affects the Navy.

Each year we see an increase in the list of different types of equipment and weapons handled by each specialist, equipment and instruments are becoming more complex, they are containing more and more elements of automatic control, remote control and electronics. The radical rearmament of the Soviet Navy, the addition of new submarines and surface craft, the introduction of nuclear power units and missile weapons, further improvement in means of observation, communications, and control systems have brought out the problem of a decisive change in the methods of specialist training, and this is a critical problem, for people -- officers, petty-officers and seamen, called upon to handle the new equipment -- who are still the primary and decisive force in the fighting capabilities of the Navy, now must possess profound knowledge of mathematics, nuclear physics, electronics and automatic control. In spite of the neces-

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sity of increasing the volume of knowledge, the time allocated for training officers, petty-officers and seamen cannot increase to an unlimited extent. Regular modernization of military equipment demands timely personnel retraining, that is supplementary training necessitating leaving the ship or chast'.

Under these conditions retention and even more so reduction of training time becomes a more and more difficult matter. In order to avoid lengthening periods of training, a number of training detachments and schools are making attempts to improve the organization of training, to "span" and reduce training schedules, to differentiate the process, splitting to a maximum the functions of using and repairing equipment. However all this is failing to provide the desired results, since the essence of the existing method of training is not being changed, and the passivity of the trainee, inherent to it, is remaining the same. With this method it is impossible to establish living and constant contact between the instructors and students, as well as vice versa. The leader must base his classes on the "average" student. But then a considerable number of the trainees are passive, the talented and more well-prepared students begin to become bored and lose interest in the subject, while the less capable and worst prepared do not master everything. The far from constant, occasional student-teacher feedback makes it impossible for the instructor to know whether the students understand the material well, and the students cannot be sure that they understand the instructor correctly. Finally, with this class method primary emphasis is made on auditory perception (lectures, questions), which not only requires considerable time, but also fails to provide solid and sufficiently complete mastery by the students of the material imparted by the instructor.

The shortcomings indicated in the existing method of teaching cannot be eliminated without a radical reorganization, in spite of the fact that the organization and entire system of training petty-officers and seamen at the present time has been developed to a high level, the training detachments and schools are staffed with well-qualified instructors, the classrooms and laboratories are furnished with the latest equipment and weapons, various models and mockups, operating training units, attractive diagrams and posters. Naturally the training system should continue to improve, but neither improvement of the existing organization nor "recovery" and reduction in the curricula, nor differentiation in teaching matter will result in a great reduction in the training period and a noticeable improvement in the quality of specialist training. This is due to the lack of correspondence between the teaching methods and the amount, depth and time devoted to acquiring knowledge and skills by the trainees.

How can we reduce the training time and improve the quality of specialist training? Obviously we can solve this problem only with the introduction of basically different training methods, a radical change in the teaching process and the utilization of the most modern equipment. Marshal of the Soviet Union R. Ye. Malinovskiy on 26 June 1963 said in his speech at a reception in the Kremlin, in honor of the graduating classes at service academies, that "fine prospects in the matter of improving teaching, as attested to by the experience of some higher service schools, are opened up by the method of programmed teaching with the use of electronic equipment. This method enables us to increase student activity, to increase the percentage weight of student independent work and will enable students to obtain deeper knowledge within the prescribed time, and knowledge in greater amounts. We must incorporate the method of programmed teaching into service schools and into the troops more extensively and boldly."

The essence of this method consists in doling out the class material in scientifically well-substantiated "portions" accompanied by careful inspection and self-inspection of mastery of the material during the process of learning. Programmed teaching is not the result of perfecting existing methods of the teaching process, but a fundamentally new method, characteristic for which are the following: efficient and logical organization of the course of study, excluding needless repetition and parallelism in studying individual topics; breakdown of each topic into sequential, sensibly complete portions (sections), corresponding to optimum doses of information mastery; strict observance of sequence in studying sections of the training course and immediate by-operation inspection; unification of knowledge and ability through the conscious mastery of algorithms (algorithm -- precise prescription of the procedure for carrying out specific actions in solving problems of a common type) of each section of the training course; efficient individualization of the training process; active work by the trainees in mastering the course materials; the opportunity for the trainees to use devices and equipment extensively.

Reorganization of training on a programmed basis demands primarily elimination from the course of everything superfluous, a painstaking selection of the basic and most essential material, determination of methodically well-grounded sequence in presentation, isolation of specific problems at each stage and division of the entire material into portions for single-act perception by the trainees.

The development of new programmed courses naturally demands new textbooks and materials which should present the above-mentioned portions. Each one would contain at the end a list of books and manuals so that the trainee, if he is having difficulty in mastering the section of the topic, can obtain supplementary information. The logical end to each portion are control questions (examples, problems), the answers to which determine the degree and quality of conscious mastery of the material. Control problems are also given in cases whereby it is essential to synthesize knowledge on preceding sections of a topic or on a topic as a whole. The necessity of answering control questions systematically and solving problems in the course of studying material eliminates learning by rote, increases the activity of the trainee and thus promotes a more conscious acquisition of knowledge. The distinguishing features of special textbooks for programmed teaching are conciseness, clarity and logical sequence in the portioned exposition of material. In addition, the use of special textbooks and teaching aids eliminates to a certain degree the lack of feedback between student and instructor.

First experiments in programmed teaching showed that it sharply increases the effectiveness of assimilating material on the part of the students. This method provides particularly fine results in the use of special teaching machines, where feedback is the most complete, solid and constant. Teaching machines can be used at all stages both of a theoretical and practical training course. According to the functions carried out in the teaching process, teaching machines can be divided into control-checking and teaching machines proper. Verifying machines are simpler in construction principles than the teaching machines proper. Their objective is to determine the knowledge of the students according to a previously worked out program, verifying the correctness of solutions to specific problems or execution of specific actions, determining errors made and coming up with an evaluation, depending on the number and nature of mistakes made. At the basis of these machines are relay patterns with step selectors, switches, light indicators, etc. The student feeds answers to questions into the machine by actuating tumbler switches, pressing buttons, keys or selecting specific number combinations.

Teaching machines proper are complex automatic devices designed to communicate specific information to the students with the help of sound reproducing and projecting equipment and for checking the assimilation of material by the students. Depending on the complexity and method of teaching, machines can operate on a linear or branched program. The linear program is made up for sequential exposition of teaching material by portions given by the machine after receiving the correct answer (correct solution to the probem). The simplicity of programs determines the relative simplicity of the machines: essentially they are conventional sound reproducing and projection instruments, supplemented by a simple device for evaluating the correctness of responses.

The branched program is developed to present material proceeding from the degree of assimilation by the student. The existence of constant feedback between the student and machine enables the machine to react to individual abilities of the student (since the machine operation program has variants depending on the correctness of responses to control questions). If a correct answer has been received to the control question, the machine issues the next portion of the material. If the response is incomplete or not quite accurate, the machine either gives advice on how to reach a proper response or shows the logical variant solution to the problem. If the answer is incorrect, the machine suggests supplementary teaching material, after which the control question is given once again.

The most complicated and laborious operation in the programmed teaching method is selection of material to be learned, determination of the forms and methods of presenting it, including breaking the material down into specific sections, doses and portions which are subsequently communicated to the trainee. For a scientific approach to the solution to these problems statistical data are required which express the influence of methods, the volume (portions) and nature of feeding the teaching material on its assimilation potential by the trainees. Therefore some machines can have as a supplementary assembly a device for statistically calculating true and false answers, as well as devices for automatic printed registration of certain data important for drawing up the programs (for example, time necessary for studying each portion of teaching material, quantity of supplementary information utilized by the student, a list of responses introduced for each problem, time spent on obtaining answers, etc.). This registration will make it possible to collect rich statistical data and to improve significantly the programming of the teaching process.

Machines for operating on the branched program are more complex than machines with a linear program. They contain projectors, slides or microfilm, closed television systems, electronic computer devices, control and regulation instruments, etc. Programmed teaching material is projected onto the television circuit screen, accompanied by sound (for example, short films with sound or slides with voice accompaniment). The student answers the questions of the machine, selecting the required numbers, letters, drawing figures, tracing diagrams, etc. The answer is given on the television screen, and an evaluation of the answer is also reproduced there. The individual teaching process cycle on an electronic machine consists of the following elements. The student is given the next portion of the teaching material in accordance with the previously developed program and instructions on the form and completeness of answers (to present a solution to the problem with selection of answer "yes" or "no", to give a solution in a concise or extensive form). Upon studying that portion of the teaching material, the student feeds an answer into the machine, which evaluates the results and, if the answer is correct, feeds the student a new portion of material. As is well known, the level of student training and rapidity in assimilating material can differ. Not all students after receiving the next portion of teaching material will be able to assimilate it completely and supply a proper answer. Therefore the machine design provides for the possibility of feeding supplementary training materials, in which the basic problem is broken down into a series of easier ones. It is not obligatory to examine and listen to all the supplementary material. As soon as the problem becomes clear, the student switches the machine over to continue feeding the basic material.

During the course of the lesson the instructor, sitting at the control console, can check with the aid of instruments the teaching process and at the end of the lesson can have in written form full information on the degree of success achieved by each student. We should go into particular detail on the matter of using teaching machines designed for forming practical skills. We believe that such devices should be used extensively in the Armed Forces training system. The specific nature of Armed Forces training requires the acquisition by specialists not only of theoretical knowledge but of solid skills, reaching the point of automatism, of combat and daily handling of weapons and equipment. This problem can be solved most effectively with the help of teaching machines. The use of cybernetic devices for developing practical skills contains a number of substantial, positive elements. In particular it makes it possible in the briefest manner and in a minimum period of time to form and solidify the algorithm of a specific practical act. It enables the student to conduct independent practice sessions with discovery and analysis of errors committed. It enables the instructor to effect a careful and detailed by-operation inspection and control over the actions by the students. Teaching machines designed for developing practical skills are not as universal as other teaching machines, and they must be built applicable to specific types and models of equipment and weapons (a fact which, however, should not inhibit their development).

Many experiments have been conducted to determine the effectiveness of the programmed teaching method. These experiments have shown that with this method material is assimulated much better than with conventional methods. In addition, the new method cuts the training period by one-half or two-thirds. Use of automatic instruments for verifying knowledge, for example, cuts the time spent on this by 80% and more, and the objectivity of examinations is considerably higher. Interesting data exists on the effectiveness of using electronic teaching machines in industry. Tests have shown, for example, that the extensive incorporation of such machines into the worker training processes for persons engaged in complicated and responsible operations in the assembly of equipment, has led to a reduction in defective goods of 70%, while labor productivity has increased 50 to 100%. At the present time programmed teaching with the use of teaching machines is being incorporated universally into the teaching process. Much work is being done in the Navy. But not all problems have yet been solved. We consider it essential to acquaint all teaching specialists, instructors, laboratory assistants, officers and petty-officers in training detachments and schools as extensively as possible with the new teaching methods. We should note that programming of the teaching process, developing special textbooks for it and programs for the teaching machines constitutes a complicated job and depends to a great extent on clarity in formulating the aims and objectives of teaching, the correctness of determining the basic elements of the teaching process. This job can be done successfully only through joining the efforts of the finest methods specialists, instructors, psychologists, programmers, electronics specialists, etc., and by joining together the creative search being carried out by related educational and scientific establishments. Merely the first steps, but very promising ones to be sure, have been taken in developing the theoretical principles of programmed teaching, in writing programmed textbooks and teaching aids, in building diverse teaching machines and in organizing the practical application of the new teaching method. A number of training detachments have studied the possibilities of applying programmed teaching for training specialists in the Navy. At a theoretical conference held in a training detachment, problems of reorganizing the specialist training process were discussed. In particular the wish was expressed that together with programming the teaching process, writing textbooks and developing programs for the teaching machines, groups of initiative from the schools and detachments would organize the experimental manufacture of simple teaching, consultation and coaching machines, training equipment and automatic instruments for taking examinations (these machines can be used also to check the quality of the new textbooks and programs, as well as to amass experience in introducing the new teaching method).

In the training detachment where one of the authors of this article serves, construction of a teaching machine is being completed, a machine which will not only check theoretical knowledge on problems of operating shipboard equipment, but which will teach practical skills as well. The machine will also be able to give trainees needed assistance and evaluate their knowledge and skills on the five digit grading system. Elaboration of the problems of programmed teaching and introduction of machines into the teaching process are creating excellent prospects for further improvement in the specialist training process. Naturally all this does not signify that the programmmed teaching method with the use of teaching machines can, as they say, "under full momentum", be brought to life. It must be introduced gradually, as we accumulate experience and facilities. At first both existing and new teaching methods will be used. But in time the machine method will occupy a dominant position not only in training detachments and schools, but also in higher Armed Services schools, on board the ships and in the chasti of the Navy, in training offices and classrooms of soyedineniya and chasti, that is in the entire specialist training system. An important part will be played by our central Navy supply organs in matters of introducing the new methods. The availability and quality of electronic teaching machines, slides and short films on various problems of combat and daily operation of equipment, repairs, regulation work, verification of operating specifications, etc., attached to each specific model, will depend on the activity of these organs. It is extremely important that various training devices, short films, etc., are received by the Navy simultaneously with new equipment and even with experimental models of new equipment. This obviously will become possible only when the institutes have specialist groups directly involved in this. Then when a new model weapon or piece of equipment appears they will be able to build proper models of training devices, films, etc. We believe that along with the issue of an assignment to develop a new type of equipment, provision must be made for the development of teaching devices and movies for it, including the cost of the prototype model. In this case the state committee which adopts the model of a piece of new equipment, will be able at the same time to adopt, approve and evaluate the quality of teaching aids, and the Navy will be able to obtain immediately, alongside new model equipment, the training facilities needed.

In conclusion we can make several general statements.

1. Programmed teaching is not an end in itself, but an important means of increasing the combat readiness of the Soviet Army and Navy.

2. The transition to programmed teaching, particularly with the use of teaching machines, makes it possible to increase the volume of knowledge and skills acquired by specialists, maintaining (or even reducing) the training period.

3. Automation of training and the incorporation of teaching machines greatly increases the role and responsibility of the instructor and creates conditions for a further improvement in the process of accelerated training.

4. The transition to programmed training and the introduction of cybernetic teaching devices frees the instructor from little productive labor in verifying test work, homework assignments, etc., making it possible for him to do genuinely creative work in improving the forms and methods of training, enabling him to work in a genuinely differentiated manner with the trainees, taking their individual characteristics into consideration.

5. Emphasis on the students doing their own work in assimilating knowledge develops their creative thought, eliminates drilling and learning by rote, increases consciousness and activeness in the learning process. Incorporation of the programmed method into the teaching process constitutes one of the means for achieving a further improvement in the training of highly skilled military specialists, persons capable of solving the varied problems involving our national defense.

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CONSTANTLY IMPROVING PARTY DIRECTION OF ADMINISTRATIVE ORGANS

/Following is the translation of an article by B. Shumilin, Chief of the Administrative Organ Division of the CC of the Belorussian CP, in the Russian-language journal Sotsialisticheskaya Zakonnost' (Socialist Legality), Moscow Monthly Journal, No 8, August 1963, pages 16-20./

The personnel of Belorussian SSR administrative organs together with the entire nation are actively campaigning to meet the assignments of building Communism. The positive results achieved by them are due to the fact that the CP, supported by the resolutions of the 20th, 21st and 22nd congresses, and decrees by plena of the CC, has strengthened direction of police /militsiya/ organs, the prosecutor general's office, the courts and state security organs, and the Party has also stepped up attention to their activities. The organs of the state prosecutor, the courts and police in this republic have stepped up the fight against persons committing crimes dangerous to society, and are engaging more vigorously in crime prevention. On this basis, the crime rate in this republic is dropping gradually, and socialist legality is becoming stronger. In a number of areas there have been no major crimes in the last three or four years.

But nevertheless a rather large number of crimes are still being committed in this republic, particularly in those oblasts and rayons where administrative organs are doing a poor job in fighting crime, where there is no real contact with the civic forces in the community. Cases have occurred of an indulgent attitude toward dangerous criminals, and on the other hand, cases have also occurred of unduly harsh punishment against persons who have committed their first crimes, merely misdemeanors, and sometimes citizens have been unjustly arrested and punished. Cases have occurred of poor and superficial crime investigation, and frequently in this process mistakes have been made and legality has been violated.

The CC of the CPSU has indicated many times that the great and complex tasks assigned by the Party to administrative organs demand a further improvement in Party direction of their work, increased attention toward their activities, all-out support, as well as care for [illegible] living and working conditions of the employees of these agencies. The CC of the CP of Belorussia has taken necessary steps to improve the activities of the republic administrative organs. Implementing the resolutions of the 22nd CPSU Congress, republic Party committees have strengthened leadership of police organs, the courts and prosecutor's offices, and they have begun devoting considerably greater attention toward the selection and training of the personnel of these agencies. Problems of organizing the fight against crime are being discussed more frequently on oblast, city, rayon and Party committees. Primary attention is being devoted toward the all-out improvement of the operations of local police organs, the district attorney's office /prokuratura/ and the courts, activization of the work done by volunteer people's law enforcement teams /druzhiny/ and comrade's courts, as well as the further recruitment of workers for maintaining public order and law enforcement work.

Last year the bureau of the CC of the CP of Belorussia examined problems involving the work of the republic prosecutor's office /prokuratura/ and Supreme Court of the Republic and took steps aimed at improving their operations. Pursuant to the resolutions of the CC of the CP of Belorussia, oblast conferences were held for personnel of the courts and district attorney's office, Party meetings in local organizations of these organs, and practical steps were outlined to eliminate shortcomings in their activities. This year the CC of the CP of Belorussia checked the state of inquest and investigation work in police organs and prosecutor's offices. The check revealed cases of red tape, unjustified initiation and termination of criminal cases and other violations of socialist legality. The materials obtained through the inspection were carefully studied by the CC of the CPB together with the prosecutor's office and the Republic Law Enforcement Ministry. The causes for the poor quality in crime investigation were determined, and steps were outlined to improve investigation work, to increase the skills of investigation personnel. The CC of the CPB /Communist Party of Belorussia/ also examined other important problems in organizing the fight against crime, recruiting the community at large to participate in this campaign, improving the coordination of the actions taken by administrative organs and their contacts with the public at large. In the aim of increasing the role played by comrade's courts and volunteer law enforcement teams in the republic the training procedure was specified for chairmen of comrade's courts, law enforcement team leaders, and permanent seminars were set up for these persons in all cities and rayons, seminars directed by Party and Soviet workers. The Presidium of the CC of the CPB passed a decree to hold worker meetings at enterprises, on kolkhozes and sovkhozes, in establishments and organizations in this republic, with the following agendum: "the campaign for exemplary civil order and law enforcement -- a job for all workers." The Party, Soviet, trade-union and Komsomol active, personnel from administrative organs, representatives of the intelligentsia, old Party members, veterans of labor, etc., are participating in preparing for and holding these meetings. In the cities and rayons of this republic, every three months interdepartmental conferences of administrative organ personnel are held, with participation by secretaries of rayon and city CPB committees, Party committees, the chairmen of city and rayon executive committees and their deputy chairmen, where the state of the fight against crime is analyzed, where practical steps are outlined for improving the quality of work being done, the eradication of causes breeding crime, organization of cadre training, etc.

Considerable attention is being devoted by oblast Party committees toward the fight against crime, and toward raising the level of work done by administrative organs. Meetings of the oblast Party active and oblast committee bureaus outline steps for strengthening law enforcement, stamping out crime and other things damaging society. A comprehensive talk was held in April at the bureau of the Grodnenskaya Industrial Oblast Party Committee, with discussion of the work of the district attorney's office of Grodnenskaya Oblast. Inspecting the work done by the district attorney's office, the oblast committee pinpointed serious shortcomings in the organization of the fight against crime. The district attorney's office was getting involved in red tape, permitting violations of legality, and investigation was being conducted in a clumsy manner in many cases. Cases of unwarranted arrest of private citizens had not been completely eliminated. The demands of the law for an objective, comprehensive and complete investigation of the circumstances of a case were frequently violated. Last year 8.4% of all cases were brought to a conclusion by the district attorney's office with violation of minimum time limits established by law. Unsatisfactory investigation work was done in cases of theft and squandering of socialist property. Insufficient attention was devoted to crime prevention work and public relations. Work done to increase professional skills was not always of a specific nature, and there was attention to form with consequent detriment to content. The oblast committee bureau demanded that the oblast public prosecutor, Volokh, take effective measures to eliminate these shortcomings, to increase demandingness on his personnel, to study and analyze the state of the fight against crime, to elucidate the causes and conditions fostering the commission of crimes, and to take steps to eliminate them and improve cadre ideological training.

A number of city and rayon CPB committees and Party committees are guiding the work done by administrative organs skillfully and knowledgeably. A good job is being done in organizing the fight against crime and directing the organs of the prosecutor's office, courts and police by the Sovetskiy Rayon Party Committee of the city of Minsk. The rayon committee bureau twice last year examined, with participation of personnel from these organs, the matter of the safety of socialist property at a number of enterprises. The rayon committee is focusing much attention on recruitment of the public at large to participate in keeping the peace. The rayon volunteer people's law enforcement team headquarters staff, headed by rayon Party committee secretary Sharko, is directing the teams, organizing training for team members, etc. The rayon contains 50 of these civilian constabulary groups, joining in their ranks more than 9000 volunteer civilian policeman. Last year the rayon Party committee bureau discussed on four different occasions the activities of these constabulary groups. Once every three months the rayon committee holds seminars for the commanders of volunteer civilian constabulary groups, conferences for the secretaries of Party organizations on the matter of strengthening law enforcement. The rayon has good coordination between the police force and the volunteer group members. They have established invididual attention and help for adolescents with criminal tendencies. Last year volunteer civilian constabulary members detained many law violators and exposed ten professional loafers. Much work is being done in this rayon to publicize legal information. The joint efforts of the rayon Party committee, organs of the prosecutor's office, the courts, the police and community at large, aimed at stamping out law violations, are having positive results. Last year there was an 11% drop in the number of persons convicted of crimes and the percentage of crimes solved increased.

Success in the fight against crime and other negative phenomena cannot be achieved without capable cadres of initiative, educated in a spirit of great responsibility for the job assigned them, without an implacable attitude toward shortcomings and active support of all new advancements. Work with cadres is an important constituent part of the activity of Party organs. In recent years the courts, prosecutor's office organs and republic police departments have received many young specialists with legal training. Party and Komsomol organizations have sent hundreds of their members to permanent jobs in administrative organs. Recently Kladukhin, chairman of the Pukhovichskiy Party Committee, Antiporovich, secretary of the Kamenets Party Committee were sent to work in the republic prosecutor's office, while Kofanov, head of the Administrative Organ and Trade Division of the Mogilevskaya Industrial Oblast Party Committeee, Baykov, Secretary of the Bereza Party Committee, and many others, were sent to organs of the Ministry of Law Enforcement.

Year after year the qualitative composition of administrative organ personnel improves. Republic Party organs have stepped up the demands made on personnel in the courts, public prosecutor's office and police departments, and they are taking vigorous steps to free these organs of persons who have not justified the confidence placed in them, persons who are not capable of organizing a proper fight against crime, incapable of achieving a strengthening of legality and law and order. Matters of selection, placement and training of cadres are being examined by local Party organizations of administrative organs. The Party organization of the personnel division of the Law Enforcement Administration of the Mogilevskaya Oblast Executive Committee discussed problems dealing with the role of communists in the personnel division in organizing educational work among personnel, on work with young specialists, on the state of training personnel in the Law Enforcement Administration, as well as other matters.

However, far from all Party committees are constantly and concretely directing the activities of the public prosecutor's office, police departments, and the courts, and they are not doing everything possible to achieve in the next few years a sharp drop and subsequently a complete elimination of crime in this country. Sometimes Party organs adopt fine resolutions, elaborate steps to step up the fight against crime and other negative phenomena, but they do not check the execution of these steps, do not fortify organizational work on the spot, in worker groups, and as a result the initiative does not reach the objective. Sometimes the fight against crime becomes a short-term campaign. Direction of administrative organs is sometimes reduced to petty supervision. At the same time such matters as study and elimination of causes and conditions giving rise to crime and other law violations, training and ideological fortification of administrative organ cadres, as well as improvements in professional qualification, frequently fall beyond the vision of Party organs. Frequently there is a lack of open and principled criticism and self-criticism of shortcomings in work, during the discussion of problems at meetings in Party organizations of administrative organs. It is impossible to improve the selection, training and placement of cadres without forming a manpower reserve. It is not a matter of formalistically drawing up lists, indicating what position a specific person can be promoted to. Unfortunately, this situation still does exist. An important job for Party organizations is that of checking on those persons placed into the reserve, knowing these persons, teaching and educating them. For example, assistant prosecutors can be a fine reserve for the positions of city and rayon public prosecutors. They should be capable organizers, experts in their field, and they should possess the appropriate level of education. We still have a number of cases of assistant city and rayon public prosecutors, persons who work in and are appointed to these posts, who have no prospects of further development. We cannot tolerate such a situation, and the CC of the CPB is taking steps to eliminate these shortcomings.

Much is being done to activate the work of local Party organizations of administrative organs. There are many local Party organizations which are intelligently and ably coping with their job of fighting crime and furthering the ideological education of communists. This can be seen in the example of the activity of the Party organization of the Brestskaya Oblast Public Prosecutor's Office. It is mobilizing communists to strengthen prosecutor's office supervision over the observance of socialist legality. It is demanding that Party members working in any specific area be implacable against all types of violations and manifestations of crime, that they be principled and that they react in a timely manner to law violations revealed. Party meetings are examining vital matters, and their discussion is of a business-like nature. In March a Party meeting was held, devoted to the work done by communists in the investigation division for organizing the campaign against theft and peculation of state and public property. A meeting on the work to be done by Party organizations with cadres was carefully prepared for.

The Party organization is devoting much attention to the political education of communists. Those of them who have good general legal and political training independently study problems of the theory of state and law, attending a theory seminar once or twice a month. Komsomol members and technical personnel are studying in political self-education study groups. In-job training has been organized for various phases of investigation and prosecution work. Help is being given to improve the level of professional skills for local personnel. Communists from the oblast public prosecutor's office frequently go out into the rayons, where they give lectures at seminars of prosecutor's office personnel, police and court personnel on problems of law and present legislation. They help solve various problems and lend assistance to volunteer civilian constabulary groups and comrade's courts.

Much work is being done by communists in publicizing and explaining Soviet laws. One hundred and eighteen lectures and talks on legal topics were given last year at enterprises, on kolkhozes, sovkozes, in organizations and establishments for workers. These talks were given by communists. Fifty-two have been given in four months of this year. Since October of last year seven classes have been held for kolkhoz chairmen in the one-year school curriculum and seven lectures have been given at the University of Legal Knowledge. Party member Pehkovskaya held twelve classes with personnel of the Brest City Executive Committee, on a study of Soviet legislation. Steps being taken by the Party organization of the Brestskaya Oblast public prosecutor's office, are having a positive effect in the fight against crime and other violations of socialist legality. The operations of the oblast prosecutor's office still contain considerable flaws, to be true. Bureaucratic delay is being permitted in some proceedings, law violations are not always discovered in a timely manner, and the causes and conditions fostering commission of crimes are being insufficiently studied. Making use of experience gained, the Party organization should improve its work, directing the efforts of the family of law enforcement officers into the fight against crime, the campaign to achieve model law enforcement in this oblast.

Party organs, the public prosecutor's offices, police departments and courts in this republic are faced with large and complicated tasks, proceeding from the resolutions of the 22nd Party Congress, in the fight against crime and other manifestations of moral turpitude, carryovers of the past and the maintenance of model order in all cities and towns. Of immense importance for the operations of administrative organs are the results of the June Plenum of the CC of the CPSU. The entire community must be marshalled into the fight against drunkards, parasites, hooligans and all those who wish to live at the public expense, giving nothing to society. In order to meet these assignments, Party organizations and administrative organ personnel should stint neither effort nor time. Further activization of the activities of the public prosecutor's offices, courts and police, and improvement of Party direction of these organs constitute a vital condition for the successful fight against crime and a strengthening of socialist legality.

10,284
CSO:1850-S

COLLEGE FOR ARMED FORCES PERSONNEL

[Following is the translation of an unsigned article originally entitled "Once Again On Servicemen Studying at Higher Educational Institutions" in the Russian-language journal Kommunist Vooruzhennykh Sil (Communist In The Armed Forces), Moscow, twice-monthly journal, No 17, September 1963, pages 86-89.]

Issue No 4 of this journal for 1963 published an answer to the question "Correspondence schooling for Armed Forces Personnel". In connection with this advice the editors received more than 70 reader replies. Officers and reenlisted men are interested in many other questions involving correspondence courses in civilian institutes, the procedure of transferring from one college to another, conditions of entering higher military educational institutions, etc.

Extensive opportunities have been created in the Soviet Army and Navy for those who wish to become a higher skilled specialist. Those persons meeting the entrance requirements for Armed Forces Academies and higher Armed Forces schools can study theory and perfect their practical application of military science in basic departments, including correspondence courses, without leaving their regular duties. Reenlisted officers, sergeants and CPO's who for good reason cannot enter a higher Armed Forces school, can study in civilian correspondence or evening universities in the area of their military specialization (the conditions for Armed Forces Personnel training in civilian institutes are given in detail in the consultation column printed in the fourth issue of this journal for 1963). This training is for the achievement of a primary target -- the training of needed higher skilled cadres for the Army and Navy. This is why in selecting a civilian institute the serviceman should consider whether the area offered by the school is related to his military specialization or helps increase his military and specialized knowledge. Earlier departures from this principle are being rectified. Armed Forces personnel in the first and second semesters of study at civilian correspondence colleges in areas which have nothing in common with the nature of their work receive recommendations to transfer to civilian colleges where study will help increase their military and specialized knowledge in the area of the job presently held by them, or colleges which can provide engineering and technician training for any profession area in the Armed Forces.

In connection with this, Capt V. Smirnov asks what are the conditions of transfer from one civilian college to another? The procedure for transfer has been established by the USSR Ministry of Higher and Secondary Specialized Education. A person desiring to transfer to another college submits to the rector of that college an application, indicating his present college, semester in college and area of specialization, as well as reasons for transfer. The rector of the college to which the member of the Armed Forces wishes to transfer makes the acceptance decision, if there are any vacancies, and if there is a suitable area of training. If there is a certain difference in the curricula and programs of the two colleges, he specifies which subjects or portions of subjects must be covered in the process of course work or before beginning course work at the new college.

Readers write about cases of an incorrect approach to handling the matter of transferring from one college to another. For example, the following transfer is suggested for students in the upper semesters, although this procedure is actually only for first and second semester students. Maj A. Tribunskiy wrote the following: "I am a political worker and studied three years at law school, and they are suggesting that I transfer to a technical school."

What is the procedure of transferring from a civilian correspondence institute to a correspondence faculty (department) of a higher Armed Forces school? An answer to this question is requested by officers Yu. Vasil'yev, V. Shmelev and V. Tikhomirov. It is possible to transfer Armed Forces personnel taking correspondence courses in civilian engineering schools to appropriate higher semesters of correspondence faculties of related higher Armed Forces engineering schools. To effect such a transfer it is necessary to submit a report to the office which issued permission to study in the correspondence civilian school. If the matter is resolved in the affirmative, the report, with necessary covering documents, is sent to the higher Armed Forces school selected, which makes a final decision on the possibility and conditions of transfer.

Can officers with higher education take correspondence courses in foreign language institutes? All officers, regardless of education and position held, may perfect their knowledge of a foreign language in civilian correspondence foreign language institutes (faculties). However, this matter is not correctly resolved everywhere. Cases occur whereby officers are faced with obstacles. Senior Eng Lt G. Yepikhin, for example, tells us : "they would not let me enter the correspondence foreign language institute, motivating their refusal with the reasoning that I should be studying in a higher technical school in my professional area." Reader K. Zaytsev expressed his bewilderment in the following question: "Can an officer be forbidden to study at a foreign language institute?" Here is what Sr Lt Yu. Danilin writes: "Several times I requested to be allowed to enter a correspondence foreign language institute. Each time my request was turned down, and they instructed me to select a higher educational institution in my professional area."

The editors have received many letters with questions about conditions for admission to higher Armed Forces schools. This matter is of particular interest to officers N. Chaykovskiy, A. Ivanchilov, O. Shevchenko, G. Konovalov, V. Klimenko and others. It is not possible in this article to go into detail on the regulations for admission to all higher Armed Forces schools, particularly since they differ. We shall discuss merely some general points. Command Academies (faulties), other than the Red Banner Air Force Academy and Order of Lenin Naval Academy, command-engineering faculties and the Support Command Faculty of the Military Support and Transport Academy, accept officers with secondary military education, age 32 years or less, with position of company commander (battery commander), equal position and higher. These schools can also accept commanders of training (officer candidates) platoons who have had at least three years in that job. Engineering academies and engineering faculties accept officers from all branches and services up to the age of 28, with secondary military (military-technical) education and at least two years as an officer. Higher military engineering schools also accept enlisted and reenlisted CPO's, sergeants, soldiers and seamen up to the age of 25, and higher Naval schools -- up to the age of 22. The age of entering students is computed for 1 September of the year of admission. Persons entering higher Armed Forces schools take competitive entrance examinations. All other conditions being equal, preference in admission to higher Armed Forces schools is given to officers who have had experience in the area of academic specialization. The conditions of admission to correspondence faculties at higher military schools are the same as those for persons admitted to the basic faculties, with the exception of the fact that there is no age limit for admission to the correspondence faculties.

Armed Forces personnel who meet admission requirements and wish to enter higher military schools, shall submit no later than 1 February of the year of entrance a command report. It shall indicate the military rank and position held, general and military education, the name of the selected school and faculty, as well as the name of the foreign language to be studied. Documents are to be appended to the report on secondary general and military education. Persons entering command academies (faculties) must have a transport or combat equipment driver's certificate for their particular service. A copy of the report can be sent at that time to the military district division of cadres (fleet, troop group). The decision of the troop commander of the district, troop group, or fleet on approval for a candidate to enter a higher Armed Forces academy is communicated to the applicant before 1 April of the year of entering school. From that date the candidate acquires the right to make use of privileges established for the period of preparing for competitive entrance examinations (additional 30 day leave with his unit or for going to preparatory meetings at the schools in question, three free evenings per week from 1600 hours on, exemption from commander classes, exemption from duty roster on holidays and Sundays, retention of regular annual leave until leaving for competitive entrance examinations).

Preliminary selection examinations in Russian (dictation), physics, mathematics (orally) at the secondary general curriculum school level, and in military topography (orally), on the secondary Armed Forces School level, are held each year in April for candidates to command academies (faculties) in military districts, PVO districts and troop groups. Competitive entrance examinations for all higher Armed Forces schools are held from 20 July to 20 August. Entrance examination schedules for special disciplines are sent out by higher Armed Forces schools to the cadre divisions of military districts, troop groups and fleets no later than 1 July of the year preceding admission to the given school.

Armed Forces personnel who have completed higher combined arms command schools, advanced pilot and navigator schools, as well as higher naval schools, take competitive entrance examinations for the academies only in special disciplines. They are exempted from entrance examinations for general curriculum disciplines. This exemption is not granted for persons entering the Order of Lenin Naval Academy.

Readers V. Kochetkov, Yu. Alekseyev, N. Savchuk, Yu. Sheplyakov and others ask the following question: can first enlistment soldiers and sergeants enter Armed Forces schools? First enlistment Armed Forces personnel can be accepted by all secondary and many higher Armed Forces schools if they meet entrance requirements. For example, first enlistment soldiers, sergeants, seamen and CPO's can enter higher combined arms command schools, higher pilot and navigator schools and higher naval schools. General curriculum courses are set up for preparing candidates for competitive entrance examinations. These courses receive Armed Forces personnel regardless of length of service, as long as the applicants have a general secondary education and have expressed the desire to enter an Armed Forces school. These courses are set up in garrisons in officers' clubs, military units and offices, in general curriculum schools or Armed Forces schools, when there are at least 25 persons in the garrison who wish to prepare for entering Armed Forces schools or civilian colleges. In some cases courses can be set up with only 10 persons desiring to take them, in small garrisons, by decision of headquarters.

Persons expressing the desire to prepare for entering Armed Forces schools by taking these courses shall submit a report to headquarters with a request for permission to take these courses, they shall indicate what Armed Forces school they wish to enter, and they shall present a high school diploma or a diploma received upon completing a secondary special school. Selection of candidates for the courses is made by a commission, which is made up of representatives of the command staff, the Party and Komsomol organizations of the chast'.

Many Armed Forces personnel with higher civilian education ask whether they can enter higher Armed Forces schools. Persons with higher civilian education drafted into the Soviet Army or Navy should be appointed a position with consideration for the profession gained by them in a civilian college. If it is impossible to utilize them in their profession, if they desire they can be taken into higher Armed Forces schools at the first semester level on a general basis of passing competitive entrance examinations.

Letters to the editors contain many complaints of violation of the rights of correspondence students in the chasti. One of the reasons for this is the ignorance on the part of many officers of documents affecting Armed Forces personnel correspondence schooling. These documents cannot even always be found at headquarters. Characteristic in this respect is a letter by staff officer Yu. Kostyukov, in which he asks on the basis of which document reenlisted Armed Forces personnel can study at civilian correspondence colleges. The same question is asked by Maj Dudin, reenlisted Sr Sgts Yu. Shulichenko, I. Prokof'yev and others. Locally they could not obtain an answer to this question, although they had heard that reenlisted sergeants and master sergeants could study at civilian correspondence colleges and enjoy privileges in respect to this on an equal basis with officers.

"I am doing correspondence graduate work," writes officer A. Nikulin. "I have not made use of any additional leave time or other privileges, since I did not know that they existed. Having read the article in your journal, I requested headquarters to give me an additional 30 days leave to complete work on my dissertation. They turned down my request, saying that no such leave could be granted."

"Every time I brought up the question of going to a regular institute session," writes Sr Techn-Lt I. Drozd, "the commander did everything he could to prevent my departure. Only with the assistance of higher officers was I able to utilize leave for this purpose. The commander frequently criticized me for my studies, although there were no serious criticisms due to my job. Even a member of the chast' Party bureau, Maj Palevoy, several times advised me strongly to drop my schooling, and he also tried to keep me from going to the session."

A chast' commander and office chief is obliged to take constant interest in the studies of correspondence students, to check their fulfillment of the curriculum schedule, to assist in obtaining consultation from specialists, to present and grant the proper privileges in a timely manner, to send students to preliminary meetings and examination sessions at the request of schools, and to take into consideration the course load of correspondence students in giving them duties. The lack of such attention leads to a situation whereby the correspondence student falls behind in his studies, and frequently he ends up by dropping his courses. There is no need to belabor the point that such a situation can have a negative effect on the professional duties of the officer-correspondence student.

Little attention is being devoted to correspondence students by certain political organs and Party organizations as well, which forget that the training of highly skilled cadres in the correspondence system of higher educational institutions is a matter of national importance, and one cannot have the attitude that it is the personal affair of the students themselves. The flood of letters by members of the Armed Forces into various central offices, newspaper and journal editorial offices on matters of schooling is due to the fact that the conditions for admission into Armed Forces academies, higher schools and correspondence civilian colleges, as well as other matters affecting the training of Armed Forces personnel in higher educational institutions have been placed in various documents, published at various times. This makes it difficult to utilize them. A number of chasti and offices have many documents on schooling which were published several years ago, and some have no documents at all. Due to this situation, it would be of benefit to publish periodically a collection of printed materials including the basic regulations determining the conditions for admission to and training of Armed Forces personnel in higher military and civilian schools.

10,284
CSO:1850-S

DEVELOPMENT OF LENINIST PRINCIPLES IN MILITARY ORGANIZATIONAL DEVELOPMENT IN THE CPSU PROGRAM

/Following is the translation of an article by Col D. Grinishin and Capt 1st Rnk F. Sinenko in the Russian-language journal Kommunist Vooruzhennykh Sil, No 23, December 1963, pages 8-16./

The Armed Forces of the USSR stand as a powerful sentry, guarding the borders of our socialist land. Fulfilling their historical mission, they have twice repelled an imperialist invasion onto Soviet soil, have helped many peoples liberate themselves from the threat of fascist enslavement, and now they are vigilantly guarding the creative labor of the builders of communism and are making an immense contribution toward the defence of the entire socialist camp. The strength and invincibility of the Soviet Army and Navy lie in the fact that their constant leader and wise mentor is the heroic Communist Party. CPSU leadership is a deep-lying and basic principle of our military organizational devlopment, formulated by Lenin. In December 1918, at his suggestion, the CC of the Party adopted a decree entitled "The Policies of the War Department", which stated that "the policy of the war department, as that of all other departments and offices, is being implemented on the precise basis of the general directives issued by the Party in the person of its CC and under its direct supervision."

From the first days of existence of the Soviet State, the Party has been developing its military policy on the basis of a comprehensive study of the balance of forces in the world arena, taking into consideration changes in military science. It is the initiator and organizer of all major steps directed toward strengthening the military might of our country. The CC of the CPSU and USSR Council of Ministers discuss basic problems of military policy, matters dealing with the organization and structure of the Army and Navy, weapons, supply, and personnel training. Before making a specific decision on matters of military organizational development and matters of strengthening the military might of the Armed Forces of the USSR, the CC of the Party and presidium of the CC carefully study specific conditions and factors in the Army and Navy and take counsel with people from the military.

An important means of Party influence on the Army and Navy is Party political work among the troops. Party organizations and Army and Navy political organs weld personnel around the Party, implement its policies and educate the men in the spirit of the ideas of Marxism and Leninism, total devotion to their socialist motherland, actively assist in strengthening unity between the Army and people, and mobilize Armed Forces personnel to meet the tasks of combat and political training, mastery of new equipment and weapons, observance of conscious military discipline and flawless execution of the military duty.

The Leninist principle of Party leadership over the Armed Forces was developed further in the CPSU program, which contains the following statement: "the primary basis of military organizational development is CPSU leadership over the Armed Forces, a strengthening of the role and influence of Party organizations in the Army and Navy. The Party is devoting unstinting attention toward increasing its organizational and directive influence on all facets of the Army, Navy and Air Force, a welding of Armed Forces personnel around the CPSU and Soviet government, a strengthening of unity between Army and nation, educating the men in a spirit of courage, bravery, heroism and comradeship of arms with the armies of the socialist nations, a readiness at every moment to defend the soviet nation, which is in the process of building communism (*Materialy* [Materials] of the 22nd CPSU Congress, page 405). The growth of the directive role played by the Party in military organizational development is due first of all to the fact that as our troops are equipped with missiles and nuclear weapons as well as the most modern combat equipment, the job of strengthening our nation's defensive might and the development of Soviet military science and troop control have become many times more complex. Secondly, the international responsibilities of the Soviet Armed Forces have become much more extensive. Our Army has become one of the deciding factors in keeping the peace around the world and has been called upon to defend and reliably guarantee the security of the entire socialist camp, shoulder to shoulder with the armies of all socialist nations. Thirdly, under present conditions the role of moral and political personnel training for victorious warfare has increased considerably, if a war is started by the imperialists. This demands a strengthening of the communist training of Armed Forces personnel. Fourth, the serious threat of thermonuclear war, being hatched by the imperialists, requires strategic perspicacity by the Party, extremely circumspect and at the same time most vigorous action, directed toward muzzling the frothing aggressors. A vivid example of the flawless evaluation of international events by our Party, as well as the firmness and flexibility of its policies, were the actions taken by the Soviet government during the days of crisis in the Caribbean Sea (October-November 1962).

The CPSU resolves military matters together with all theoretical and practical problems facing the country during the period of all-out development of Communism. Its activity in the area of military organizational development proceeds from the principle of the Party program to the effect that "the CPSU views defence of our socialist land, a strengthening of the USSR defences and the might of the Soviet Armed Forces as the sacred duty of our Party, and the entire Soviet nation, as a most important function of the socialist state" (Materialy of the 22nd CPSU Congress, page 404). Organizing our national defences, the Party is supported by the military legacy of Lenin, is developing and enriching the principles of Soviet military organizational development, elaborated by our great leader, in accordance with the present situation. The principles of military organization in a socialist nation constitute scientifically substantiated ideas, the rules for practical action by the Party, state and military organs in directing the Army and Navy. By nature and specific purpose they can be subdivided into political and organizational principles and principles of troop training and education.

The political principles of our military organizational development, and the most important of these -- Party leadership -- are determining elements in respect to all the rest. They emanate from the very nature of the Soviet social and governmental structure. Lenin considered oneness of Army and People to be one of the most important political principles of our military organizational development. The Party and state, based on objective economic and sociopolitical principles, are organizing the Armed Forces in such a manner that the worker masses participate in this organizational development. From the very beginning of its existence our Army was and remains the incorporation of oneness with the people. In 1919 Lenin said: "organization of the soviets has made it possible to create an Armed Force of workers and peasants which is much more closely bound with the workers and exploited masses than it was before" (Sochineniya /Works/, Vol 29, page 88).

The Soviet Army and Navy are strongly supported by the people. Constant ideological ties between the workers and Army, supply of first-class weapons and combat equipment, constant supply of food, uniforms and other gear -- this all manifests the national love for the Armed defenders of our country and concern for their well-being. The indestructible unity between Army and people honorably withstood severe tests in cruel combat against our enemies. During the first days of the Great War for the Fatherland a movement of the two hundred percenters and the three hundred percenters developed, persons who were fulfilling norms for themselves and for their comrades who had left for the front. Front-line Komsomol youth brigades were born, etc. The forces at the rear fed the front lines and our fighting men with indestructible morale and spirit, inspiration, calling them forward to brave deeds in the name of national happiness and security.

The principle of oneness between Army and people found further development in the CPSU program and in Party resolutions. "Party, Komsomol, trade-union and other public organizations," says a decree of the June Plenum of the CC of the CPSU, "should educate all Soviet citizens in a spirit of love and respect for the glorious Armed Forces of the Soviet Union, should surround our Soviet fighting men with constant attention and care, remembering that a strengthening of our national security and the might of the Soviet Army and Navy is a vital matter for all our people."

Another facet of the practical incorporation of the same principle is the limitless love shown by our fighting men toward their people, the selfless defence of national interests. Soviet people see true sons of the nation in the disciplined, stolid and courageous fighting men, strictly observing the rules of socialist community life and Communist morals, men always ready to carry out their sacred duty, ready to come to the aid of their fellow man at a difficult time. The monolithic unity between Army and people becomes strengthened as the result of the extension of patronage ties between the personnel of chasti and the workers of enterprises, kolkhozes, schools and institutes. Invaluable assistance in the patriotic education of our Armed Forces personnel will be extended by a further broadening of contacts between Army and Navy Party, Komsomol organizations, political, military councils and local Party, Soviet, Komsomol and trade-union organizations.

The principle of socialist internationalism and friendship between peoples is immensely important in military organizational development. As early as the Civil War, on the initiative of Lenin, the military efforts ot the soviet republics were united for a joint resistance against the imperialist aggressors. The establishment of a single command for all units of the Red Army, centralization of supply distribution and distribution of the resources of the socialist republics constituted one of the major conditions for victory over the great hosts of enemies of our nation. The Leninist idea of uniting the military efforts of socialist nations for joint resistance to imperialist aggressors has taken on particular importance in our time. The CPSU, the Communist and worker parties of the socialist nations proceed from the standpoint that their people, who have established cooperation and are lending mutual assistance in economic and culutural development, should also be united in meeting the job of strengthening the defences of their countries against imperialist attack. The problem of defending one's socialist land has now emerged beyond the framework of individual nations and has taken on an international character. The CPSU program states: "The Soviet Union considers it an international obligation to provide together with other socialist nations reliable defence and security for the entire socialist camp" (Materialy of the 22nd CPSU Congress, page 404). A prime role in defending the entire socialist camp has been given by history to the Soviet Armed Forces. Due to the concern by Party and nation, Soviet nuclear potential exceeds that of America. Our weapons constitute a reliable shield covering all socialist nations against aggressor attack. The Soviet Union, which is capable of dealing a devastating return blow, is chaining down the forces of reaction and at the same time is lending invaluable aid to the entire socialist camp and all of mankind. The fact that the Soviet Union possesses missiles and nuclear weapons has without any doubt played and is continuing to play a decisive role in the fact that the socialist lands have not been attacked by the imperialists. It is this circumstance which guarantees socialist nations the opportunity to develop peacefully, to build socialism and communism victoriously.

Only contempt for the fate of the socialist system and its peoples can explain the essentially nationalistic, so-called theory of "reliance on one's own resources", which ignores that basically new element which emanates from the nature of the modern era and the revolution in military science for defending the socialist state. The proponents of this theory in actual fact are rejecting the necessity of joint efforts in the area of military defence and claiming that any socialist nation, in the struggle against imperialistic aggression, is supported primarily by its own defensive capabilities and "only after that" by the support and help of brother nations and peoples from the entire socialist camp. Such a concept is rotten through and through from a military strategy viewpoint. The dissociation of military effort by the nations of the socialist camp would place under serious threat the conquests of the workers, since not one of these nations individually possesses sufficient manpower and resources to defend itself against imperialist aggression. As for the theory of relying on the support by brother nations "only thereafter", from the viewpoint of modern warfare this is at the very least naive, since "thereafter" under the conditions of thermonuclear warfare may be too late.

Communist and worker parties, guided by jointly adopted resolutions, are rejecting any form of nationalistic theories and fully intend to join their efforts to an even greater extent in all areas, including the area of defence against imperialist aggressors. Soviet Army internationalism finds practical expression in the fact that its troops form part of the unified Armed Forces of the member nations of the Warsaw Pact. Commanders and political organs from the brother armies exchange information and data on military and political training. Their personnel are educated in a spirit of friendship among the peoples of the socialist camp and the workers of the entire world. Military maneuvers recently held in the German Democratic Republic for the armies of the Warsaw Pact nations constituted new testimony and proof of the solidarity of the Joint Armed Forces, demonstrated their high level of combat readiness and the vigorous intention on the part of the men of our brother armies to defend the conquests of socialism together. The entire world is aware of the fact that the Soviet Union has many times cast its military might on the scales of the international situation, in order to prevent or nip in the bud imperialist aggression (Suez, Syria, Taiwan, Cuba).

During the course of the development of socialist society, the principles of Soviet military organizational development undergo changes. Some of them wither away, while others become infused with new content. An important role in the organizational development of our Armed Forces at its preceding stages has been played by the class principle of filling the ranks of the Army and Navy. The young Red Army was formed exclusively of workers and peasants. They went into their Army, in order to defend their victory with weapon in hand, to defend the factories, plants and soil wrested out of the grasp of capitalists and landowners. Stalin twisted the truth when he claimed that during the Civil War years the peasants had to be "compelled" to fight for socialism, through the use of coercive methods. In actual fact, the great mass of the laboring peasantry fought for Soviet authority not through coercion, but because they knew that only Soviet authority was capable of giving the peasants land, capable of protecting them from the arbitrary justice of landowners and kulaks. Lenin stated: "no matter how much they raise a hue and cry, asserting that the bolsheviks are a party of coercion over the peasants, we say "gentlemen, that is a lie! If we were a party of coercion over the peasants, we certainly could not hold out against Kolchak, how could we build an Army with universal military obligation, in which eight out of ten are peasants, in which all are armed, in which all have seen through the example of the imperialist war that a rifle can easily be turned in various directions?" (Sochineniya, Vol 30, page 162).

The class principle of the Soviet Armed Forces was retained until the exploiter classes were liquidated in this country. Naturally, when the state of the dictatorship of the proletariat became a state of all the people, the Armed Forces of the USSR ceased being a weapon of the dictatorship of the proletariat. They are national and represent the entire people by their very sociopolitical nature, and in all their structure and activity reflect the moral and political unity of the workers, peasants and intellectuals. Defence of our nation constitutes an important and honorable duty for every Soviet citizen. Equality of rights and obligations to defend our country has extended to all Soviet citizens. Social origin has ceased playing its former role in making up the ranks of our Army. Naturally when we say that the Soviet Army and Navy have become national in nature, that they have ceased being the weapon of the dictatorship of the proletariat, this holds true only for our nation's domestic conditions, the interrelations between our Army and people. As far as the international arena is concerned, the Soviet state and its Army have not lost their class nature. As long as imperialism exists, threatening mankind with new wars, the Armed Forces of the USSR will remain a bulwark of the world's workers in the struggle against capitalist enslavement. If the aggressors are successful in unleashing war, our Soviet fighting men will be the most loyal and steadfast defenders of the deep-rooted interests of the workers and peasants of all nations, the most consistent fighters for the terminal destruction of the forces of reaction and liquidation of the capitalist system, resulting in victory of communism throughout the world.

The political principles of Soviet military organizational development also determine its organizational principles. Our Party considers a major organizational principle of our Armed Forces to be organization of the Armed Forces as regular, cadre forces, permanently ready for combat action.

This principle was laid down by Lenin in the most complicated situation of foreign military intervention and civil war, when the young republic of the soviets was able to fight off the combined campaigns of the imperialists only with a mass, highly disciplined army. The leader of the Party and Central Committee, however, stipulated that under specific conditions it might be feasible to shift to the utilization of a territorial militia system. As is well known, this system was partially (alongside the cadre principle) applied in Soviet military organizational development between 1923 and 1939. However, due to the sharply increased threat of a new armed attack on the USSR, it was necessary to reject the combined system and shift exclusively to the cadre principle of military organizational development, which has not yet lost its importance. This naturally does not mean that our country has rejected forever the territorial militia system. Khrushchev has said that under specific conditions, favorable from the viewpoint of the international situation, we could transfer the military organization of the Soviet state to this system. But at present, when danger exists of sudden attack by an aggressor against our nation, the Party gives preference to the cadre system for organizing the Army and regular troop combat training. This system has made it possible to make the Armed Forces of the USSR into a smoothly operating organism, capable of carrying out any combat assignment at any given moment.

The combat might of our Army and Navy is also guaranteed by strict observance of the principle of constant improvement of organizational structure, coordinated and commensurate development of the branches of the Armed Forces and types of troops. The Party makes certain that the structure and form of Armed Forces organization always correspond to the present level of technical development, the demands of military science and the art of warfare. In view of the development of intercontinental missiles, capable of delivering an atomic warhead to any point on the globe, the CC of the Party and Soviet government adopted a resolution to create a new branch of the Armed Forces -- Strategic Missile Troops. Observing the Leninist principles of military organizational development, the CPSU has determined the main direction of military technical policy. It consists in equipping all branches of the Armed Forces and all types of troops with the most modern weapons. "The Soviet state," says the CPSU program, "will see that its Armed Forces are powerful, equipped with the most modern means of defending our nation -- atomic and thermonuclear weapons, missiles of all combat ranges, and it will see that all types of military equipment and weapons are maintained at a proper level" (Materialy of the 22nd CPSU Congress, page 404). The revolution in the military which has taken place in this country has made new demands in turn on the entire military organization, on its flexibility, mobility, particularly on improvements in control and communications by incorporating cybernetics, telemechanics and other achievements of science as well as the persistent training of personnel into the military. The Party, emphasizes the CPSU program, considers it essential to maintain the defensive might of the Soviet state and the combat readiness of its Armed Forces at a level guaranteeing a decisive and total defeat to any enemy who dares attack the Soviet Union.

One-man command is quite important in the system of USSR Armed Forces leadership and command. It corresponds most completely to the nature of our Armed Forces and the demands of warfare. In the military more than anywhere else, a strict unity of action by large masses of people is essential, subordination of the will of thousands to the will of one person -- the commander. The CPSU program points out that one-man command constitutes a foundation principle for organization of the Soviet Armed Forces. Implementing this principle, the Party is following the behests of the great Lenin. Lenin characterized one-man command as the only proper way to operate, for it guarantees the optimum utilization of human potential and a practical and not verbal verification of a job done, personal responsibility for the results of a job. In our Army one-man command is organized and consolidated on the principles of the Communist Party attitude. All matters of military theory and practice are decided by commanders in strict accordance with Party ideology and policy, on the basis of its decisions and instructions. Party organizations and political organs which guarantee Party influence on all facets of Armed Forces activities, develop fine political and professional qualities in officers, generals and admirals. The CC of the CPSU insists on an all-out increase in the authority of one-man commanders, pointing out that this authority is based upon irreproachable service by officers, generals and admirals to their nation, upon solid military and political knowledge, as well as a proper attitude toward their subordinates. A further increase in officer authority directly involves solution to the task of educating the educators, a task formulated by the Ministry of Defence.

Placement of military cadres according to political and professional qualities constitutes one of the major principles of organizational development in the USSR Armed Forces. The CC of the Party takes paternal care to see that the Leninist principles of selection and promotion of military leaders are strictly adhered to. Under present-day conditions, the Party emphasizes that a further increase in combat readiness for the Army and Navy depends not only on the constant improvement of troop organization, arms and combat equipment, but also on the proper placement and training of officers, generals and admirals. It demands a bold combination of veteran, experienced cadres with young men of initiative, it demands a vigorous end to cases whereby certain persons are promoted not due to their political and professional qualifications but due to friendships and personal contacts. This approach to promotion of cadres is absolutely intolerable, for it generates a lack of principles and servility in the behavior of certain officers, generals and admirals in respect to the senior officers exercising patronage over them, and this hinders the growth of capable men who know their job well and causes tremendous damage.

A well balanced system of Armed Forces personnel training and education corresponds to the demands of modern warfare and the problems of troop combat readiness. At its basis lie the Leninist ideas of the necessity of training politically mature men of initiative, disciplined defenders of our socialist land who have a superior mastery of arms. The development of many different types of new and complex combat equipment not only fails to lessen but even increases the role of man as the main factor in war. Naturally for victory in modern combat the fighting man must have at his disposal the most modern weapons and must possess the knowledge of using them. But a one-sided, purely technical approach toward the development of the military is pregnant with fatal consequences. The Party demands a painstaking education of Soviet fighting men who are totally true to the ideals of Communism, prepared to carry out their duty under any and all conditions. The CPSU program states: "All Soviet fighting men should be educated in a spirit of total loyalty to their people, to the cause of Communism, ready to give their all, and if necessary to give their lives, for the sake of defending their socialist land" (Materialy of the 22nd CPSU Congress, pages 404-405). The training of such comprehensively developed men is achieved primarily through educating them in Communist consciousness. The assimilation of a Marxist-Leninist ideological outlook enables soldiers, seamen, sergeants, master-sergeants, CPO's, officers, generals and admirals to comprehend correctly the essence of development of civic life, the policies of Party and government, and creates solid ground for a scientific comprehension of the laws of modern warfare, the tendencies in the development of the military. Our command cadres are faced with particularly responsible tasks in this area. Profound military and theoretical knowledge alone enable our officers, generals and admirals to combine organically personnel training and education, to implement the leading principle of combat training -- to teach a man what will be required in a war where missiles and nuclear weapons are used, to maintain the combat capability and combat readiness of chasti and ships.

A most important element of constant combat readiness is a high level of military discipline in personnel, forming one of the major principles of organizational development in the Soviet Armed Forces. Lenin called upon Soviet fighting men to execute not through fear but through conscience all the laws in the Soviet Army, orders by superiors, regulations and instructions, doing everything in their power to maintain discipline and proper organization. Speaking at the Eighth Party Congress against the military opposition, which was endeavoring to drag the Party toward anarchy and partisanism, he demanded that all communists without exception master military science and display an example of discipline, organization and readiness to sacrifice everything for victory. All the works by Lenin on the Soviet Army are permeated with the idea of the necessity of most stringent revolutionary discipline and constant vigilance. Lenin could not tolerate slovenliness, slipshod behavior, believing that any complacency or lack of observance of law causes damage to our great cause and in the final analysis plays into the hands of the enemies of the workers. It follows from this that Soviet military discipline is a profoundly political phenomenon in which the moral and combat qualities of the fighting men are reflected as at the focal point of a magnifying glass. The invincible strength of discipline lies in conscientious fulfillment by soldiers, seamen, sergeants, CPO's and officers of the demands of regulations and instructions as well as orders by the commander. The Party teaches us to improve ideological training of Armed Forces personnel, achieving on this basis a strengthening of order in the Army and Navy. Each case of breach of discipline should be properly assessed from a social and political viewpoint in the Army and Navy community. Intelligible explanatory work makes up one facet of strengthening discipline. Another and no less important facet is an increase in demands on the men, a campaign for exact execution and unconditional subordination to the will and orders of the commander. The necessity of the readiness to carry out orders and its increased importance for victory over the enemy, particularly in modern warfare, is dictated by the laws of armed combat, the features of the Army as a military organization, where each person subordinates his actions to a single task facing the chast' or podrazdeleniye. The Party considers persuasion and suggestion to be major steps in strengthening military discipline. This emanates from the very socialist nature of our Armed Forces, from the Leninist principles of educating Soviet citizens. As for coercive and punitive measures, in spite of their necessity, they are of a subordinate nature and also serve as a means of affecting the human consciousness, of forming in a person habits of following the call of duty and the demands of regulations in all cases.

The CPSU program has incorporated the idea of Lenin on self-discipline, that is discipline which becomes a conscious inner need in man. The Soviet Army and Navy are richly endowed with educators who are skillfully developing in their subordinates the sincere desire to carry out the strict laws of army life not only through a force of obligation but also due to the calling of their hearts, making all their deeds and thoughts on the same high level as the noble standards of communist ethics.

Elaboration by the Party of the major problems in military organizational development, development and implementation of the Leninist principles of military organization in the socialist state, equip our cadres with clear perspective and point out concrete means of attaining further improvement in the USSR Armed Forces -- the dependable guardian of our nation, the interests of socialism and peace throughout the world.

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APPLICATION OF THE PROGRAMMED TEACHING METHOD IN TRAINING NAVY SPECIALISTS

[Following is the translation of an article by Engr-Col I. R. Freydzon and Engr-Capt 3rd Rank A. A. Gaziyev in the Russian-language journal *Morskoy Sbornik*, No 12, December 1963, pages 15-19.]

The reasons for the development and the essence of the programmed teaching method have already been discussed many times in our press (for example, see the article by B. V. Gnedenko entitled "Programmed Teaching" in this journal, No 9 for 1963, the article by V. N. Kal'nik, A. G. Leybovich and G. S. Sarantsev entitled "New Specialist Training Methods" [No 10 for 1963], the article by G. G. Maslov, entitled "Programmed Teaching" [*Matematika v Shkole* (Mathematics in School), No 2 for 1963], the article by P. Ya. Gal'perin entitled "Development of Studies on the Formation of Mental Acts" [the collection *Psikhologicheskaya Nauka* (Science of Psychology), Vol 1 for 1959]).

In spite of the lack of perfection of methods of applying the new teaching method, its advantages over previous methods are obvious. Therefore, one of the present and vital tasks of mass training for specialist cadres has become improvement of the methods of practical application of programmed teaching, accumulation and synthesis of experience in this problem. In this article we shall discuss some experience gained in applying the new method in training specialists in the Navy. The application of programmed teaching for this purpose showed that at present it is still advisable to retain conventional forms of teaching: lectures, independent work by students, practical classes and lab work. Lectures can be either of a theoretical nature, practical or descriptive. Such a breakdown of lecture material facilitates the application of the program method in the teaching process. In our opinion, lectures of a theoretical nature at the present stage of the development of this method are essential, but with the achievement of student-lecture feed-back with the help of control-teaching devices. It is already at present advisable to replace lectures of a descriptive and topical nature by independent student work. In this case merely an introductory lecture is needed, which should reveal the principles of the training course and give the guidelines for independent work. Independent work demands from the student a conscious study with comprehension of course material, systematic deepening and consolidation of existing knowledge and the acquisition of new knowledge. This develops activeness, individual thinking, increases organization, clearness of purpose and persistence in one's work. Therefore it is essential to endeavor to create conditions for student work on course material at a proper rate. Here an important part is played by various teaching devices, but success depends entirely on the quality of the teaching program. In drawing up a program from the general volume of course materials, the most important elements are selected, broken down into logically complete units (portions) and placed in a specific order, whereby the content of each subsequent portion is based on knowledge obtained by the students in the preceding portions. Then control questions are given to the students after studying each part of the course material. They should be formulated extremely precisely, concisely, and should embrace the total content of the course material which has been digested. The necessity of answering such questions activates students' thoughts and requires them to use all knowledge acquired in the process of training. Therefore, questions should be formulated not only to verify the level of knowledge, but also to direct efforts in assimilating course material, facilitating and accelerating the learning process. The entirety of questions and answers for one logically complete portion of teaching material with indication of appropriate texts is drawn up in the form of a programmed teaching card. The number of cards depends on the amount of material and number of portions into which the material has been divided. These cards and existing control-teaching devices enable the student to do the following: 1) in independent work, after studying a portion of the teaching material, to check himself by feeding into the control-teaching device answers to the questions contained on the programmed teaching card; when the device signals "correct" the student moves to a study of the following portion of the teaching material, and when the signal is "wrong" -- he goes through additional teaching material indicated on the card, until those unclear elements are clarified; 2) in preparing for examinations, quizzes, or lab assignments he can test his knowledge on the entire course (subject, discipline); in this case the questions may not correspond to the sequence of the course, but should totally

Programmed Teaching Card for the Course "Rocket Technology"

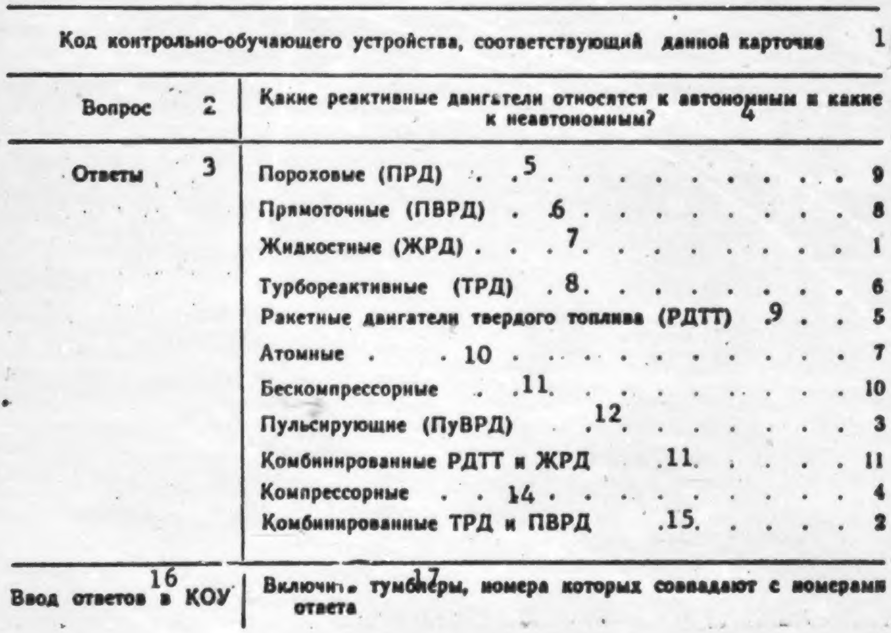
Код контрольно-обучающего устройства, соответствующий данной карточке 1			
Тема, учебные пособия, материальная часть	2 «Основы теории полета ракеты». Учебное пособие — «Ракетная техника», ч. I 3		
4 Наименование раздела курса, объем учебного материала, узлы материальной части	«Силы, действующие на ракету в полете», стр. 9—21 5		
6 Последовательность изучения частей раздела курса	Стр. 9—14 7	Стр. 14—18 7	Стр. 18—21 7
8 Вопросы	9 1. Описывается ли движение тела с двигателем прямой реакции вторым законом Ньютона? 2. Определяется ли реактивная тяга произведением массы истекающих газов на скорость их истечения?	10 3. Определяется ли положение ракеты в пространстве координатами ее центра тяжести в земной системе координат? 4. Существует ли в ракете точка, в которой полный аэродинамический момент равен нулю?	11 5. Подсчитайте для крылатой ракеты «М» величину силы лобового сопротивления X для случая горизонтального полета, если $N_{\text{т}}$ = . . . *л. с.* при V = ... *км/час.* 6. Определите для этой же ракеты величину подъемной силы, если коэффициент тяговооруженности K = . . .
12 Вспомогательный учебный материал, соответствующий правильному ответу	13 1. Прочтите стр. 10 2. Прочтите стр. 12	13 3. Прочтите стр. 15 4. Прочтите стр. 17, 18	14 В случае несовпадения ответов с правильными, тщательно проверьте размерность величин
15 Ввод ответов в КОУ	16 Включить тумблер в в положение «да» или «нет»	16 Включить тумблер в положение «да» или «нет»	17 Набрать на шкале ввода данных численное значение ответа

Key: 1 -- control-teaching device code, corresponding to this card; 2 -- topic, texts, materials and equipment; 3 -- "Principles of the Theory of Rocket Flight". Text -- Rocket Technology, Part I; 4 -- designation of division of course, quantity of course material, facilities; 5 -- "forces affecting a rocket in flight", pages 9-21; 6 -- sequence in studying the parts of a course section; 7 -- pages; 8 -- questions; is the movement of a body with a direct reaction engine described by Newton's second law? Is reactive traction determined by the product of the mass of outflowing gases by the velocity of ejection?; 10 -- is the position of a rocket in space determined by the coordinates of its center of gravity within the terrestrial system of coordinates? Is there a point in a rocket in which the total aerodynamic moment is equal to 0?; 11 -- calculate for winged rocket "M" the amount of frontal resistance force X for horizontal flight, if N_t = ... horsepower with V = ... KM/hr. Determine for this same rocket the value of lifting force, if the traction coefficient K = ...; 12 -- auxiliary course material, corresponding to the proper answers; 13 -- read page; 14 -- in case answers do not correspond with correct answers, carefully check values; 15 -- feed answers into control-teaching device; 16 -- turn tumbler switches to "yes" or "no" position; 17 -- select on the data feeding scale the numerical value of the answer.

embrace it. Utilization of cards and control-teaching devices in independent student work permits an individual learning rate, since upon successful assimilation of a portion of the teaching material, the student can go to the next portion, without waiting for this section to be mastered by his classmates. There is no need to have cybernetic teaching devices for each student, since the probability of simultaneous work completion is not high.

If a student masters a section (or the course as a whole) ahead of schedule, it is advisable to reward him (give him the remaining time to do as he pleases or release him). The faculty on which we are working, as a result of studies made, has elaborated and is successfully using a series of cards for programmed teaching (some of them are included) and control-teaching devices, including: a control-teaching device with a magnetic memory device (author -- Capt-Lt Yu. L. Goshchitskiy) -- for teaching students, checking their level of knowledge (noting errors made in answers) and issuing results on the teaching section; the KOU-SP (author -- Capt 3rd Rnk V. V. Kosarev) -- for independent study of a selected topic (with the use of recommended texts) and verification of knowledge gained; KOU-10 (author -- Engr V. B. Shchukin) -- for checking knowledge with differentiated evaluation; KOU-6 (author Capt 3rd Rnk Yu. N. Blagoveshchen-

Programmed Teaching Card for the "Rocket Technology" Course



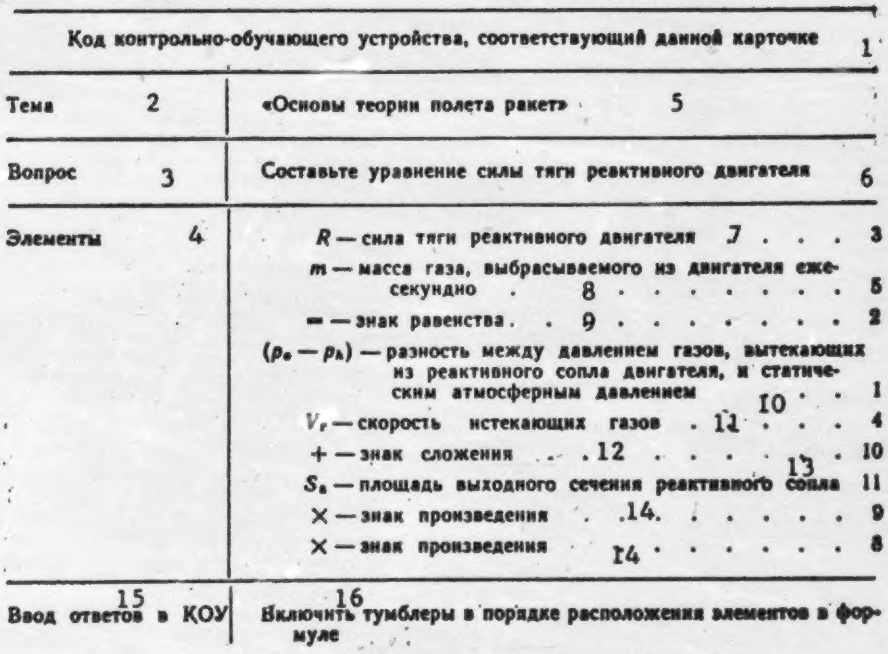
Код контрольно-обучающего устройства, соответствующий данной карточке 1		
Вопрос 2	Какие реактивные двигатели относятся к автономным и какие к неавтономным? 4	
Ответы 3	Пороховые (ПРД) 5	9
	Прямоточные (ПВРД) 6	8
	Жидкостные (ЖРД) 7	1
	Турбореактивные (ТРД) 8	6
	Ракетные двигатели твердого топлива (РДТТ) 9	5
	Атомные 10	7
	Бескомпрессорные 11	10
	Пульсирующие (ПуВРД) 12	3
	Комбинированные РДТТ и ЖРД 11	11
	Компрессорные 14	4
	Комбинированные ТРД и ПВРД 15	2
Ввод ответов в КОУ 16	Включить тумблеры, номера которых совпадают с номерами ответа 17	

Key: 1 -- control-teaching device code, corresponding to this card; 2 -- question; 3 -- answers; 4 -- which reaction engines are autonomous and which are not autonomous; 5 -- gunpowder; 6 -- direct-flow; 7 -- liquid; 8 -- turbojet; 9 -- solid fuel rocket engines; 10 -- atomic; 11 -- compressorless; 12 -- pulsating; 13 -- combined liquid and solid fuel rockets; 14 --

compressor; 15 -- combined ram and turbojet; 16 -- feeding of answers into the unit; 17 -- turn on switches the numbers of which correspond with the numbers of the answer.

skiy) -- for student verification of degree of assimilation of teaching material worked with; KOU-ST (authors -- Candidate of Technical Sciences S. V. Barshchevskiy and Engr Capt 3rd Rnk A. A. Gaziyev) -- for signalling the level of assimilation of teaching material during the process of a lecture.

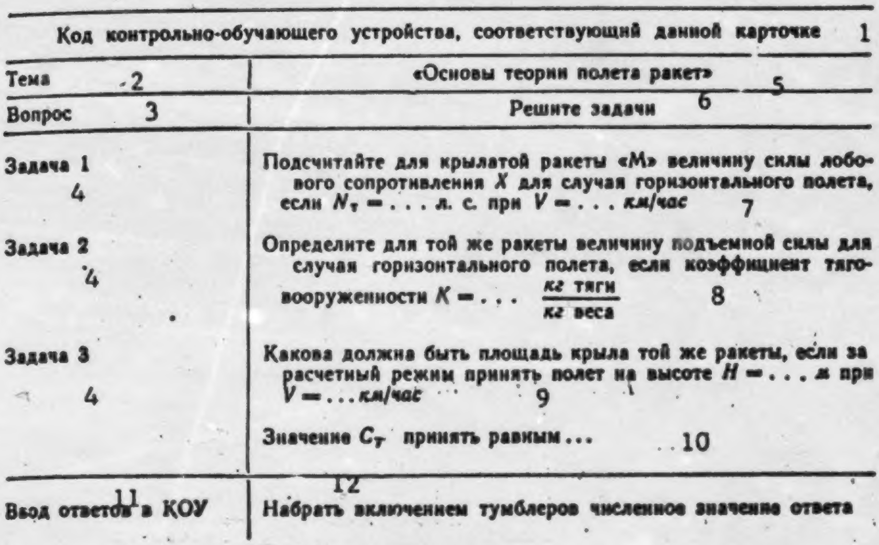
Programmed Teaching Card on the "Rocket Technology" Course



Код контрольно-обучающего устройства, соответствующий данной карточке 1		
Тема 2	«Основы теории полета ракет» 5	
Вопрос 3	Составьте уравнение силы тяги реактивного двигателя 6	
Элементы 4	R — сила тяги реактивного двигателя 7	3
	m — масса газа, выбрасываемого из двигателя ежесекундно 8	5
	= — знак равенства 9	2
	$(p_a - p_h)$ — разность между давлением газов, вытекающих из реактивного сопла двигателя, и статическим атмосферным давлением 10	1
	V_r — скорость истекающих газов 11	4
	+ — знак сложения 12	10
	S_a — площадь выходного сечения реактивного сопла 13	11
	× — знак произведения 14	9
	× — знак произведения 14	8
Ввод ответов в КОУ 15	Включить тумблеры в порядке расположения элементов в формуле 16	

Key: 1 -- control-teaching device code, corresponding to this card; 2 -- topic; 3 -- question; 4 -- elements; 5 -- "Principles of the Theory of Rocket Flight"; 6 -- form an equation of the force of pull of a reaction engine; 7 -- reaction engine force of pull; 8 -- mass of gases ejected each second from the engine; 9 -- =; 10 -- difference between pressure of gases ejected from the reaction nozzle of the engine, and static atmospheric pressure; 11 -- velocity of escaping gases; 12 -- + ; 13 -- area of reaction nozzle exhaust section; 14 -- X; 15 -- feeding of answers into control-teaching device; 16 -- place switches in order of placement of elements in the formula.

Programmed Teaching Card for "Rocket Technology" Course



Код контрольно-обучающего устройства, соответствующий данной карточке 1	
Тема 2	«Основы теории полета ракет» 5
Вопрос 3	Решите задачи 6
Задача 1 4	Подсчитайте для крылатой ракеты «М» величину силы лобового сопротивления X для случая горизонтального полета, если $N_т = \ldots$ л. с. при $V = \ldots$ км/час 7
Задача 2 4	Определите для той же ракеты величину подъемной силы для случая горизонтального полета, если коэффициент тяговооруженности $K = \ldots \frac{\text{кг тяги}}{\text{кг веса}}$ 8
Задача 3 4	Какова должна быть площадь крыла той же ракеты, если за расчетный режим принять полет на высоте $H = \ldots$ м при $V = \ldots$ км/час 9 Значение $C_т$ принять равным ... 10
Ввод ответов в КОУ 11	12 Набрать включением тумблеров численное значение ответа

Key: 1 -- control-teaching device code, corresponding to this card; 2 -- topic; 3 -- question; 4 -- problem; 5 -- "principles of the theory of rocket flight"; 6 -- solve the problems; 7 -- calculate for winged rocket "M" the value of the frontal resistance force X for horizontal flight, if M_t = ... horsepower with V = ...KM/hr; 8 -- determine for the same rocket the lift force value for horizontal flight, if the pull coefficient K = ... KG of pull/KG of weight; 9 -- what should the wing area of this rocket be, if the flight conditions are at altitude H = ...m with V = ... KM/hr; 10 -- value of C is equal to ...; 11 -- feeding of answers into control teaching device; 12 -- select with switches the numerical value of answer.

The use of cards and control-teaching devices has made it possible to individualize the teaching process and to improve the quality of assimilating course materials. Students have been very interested in the control-teaching devices and readily utilize them in the process of independent work. The effectiveness of these devices has become particularly clear during tests, when specific answers were required to questions, answers which were evaluated automatically and impartially. Sometimes a student who gave a correct answer to the unit was asked to substantiate it.

Incorporation of the programmed teaching method involves great research and scientific methods work by the faculty in making up both texts and the programs themselves, the cards and teaching units. Experience gained in applying programmed teaching attests to the great effectiveness of this method and will require further work in perfecting it.

NOTES FROM COSMONAUT FLIGHT LOGS

/Following is the translation of an article by Col F. Lushnikov originally entitled "A Deed Which Mankind Will Not Forget" in the Russian-language newspaper Krasnaya Zvezda (Red Star), 14 December 1963, pages 3-4./

... Voluminous notebooks, several dozen pages long, in a leatherette binding. On the cover -- the coat-of-arms of the Soviet Union and in large letters: "Space Ship Flight Log". It contains notations made in space in a state of weightlessness by cosmonauts Bykovskiy and Tereshkova.

Once I held in my hands the unique sketch-board of the world's first cosmonaut, Yuriy Gagarin. This was a thin white sheet in a metal frame. To it was attached a pencil, with which Gagarin made his notations on the sheet. There were only a few of these notations -- the flight itself lasted only one hour and 48 minutes. But these were the first notations made by man in space and therefore were of particular scientific value.

Titov, Nikolayev and Popovich had real flight logs, in which they noted in greater detail the things they saw. And now we have new space documents before us. Hour by hour, day by day, Bykovskiy and Tereshkova kept a detailed and objective account of the way they felt, jotting down on the pages of the logs their observations, and assessing phenomena occurring in space. In importance, these notations are not only unique but truly invaluable due to the depth of their analysis. The cosmonauts appear in them not as unbiased observers but as scientists giving their viewpoint about many phenomena. The notations are quite diversified both by volume and nature. They discuss the way the cosmonauts felt, the operation of the great amount of equipment on board, and they contain observations made of the space around, through the portholes. The notes contain extremely valuable suggestions about cosmonaut gear and working conditions in the cabin. Every line is permeated by a spirit of extreme optimism, limitless faith in the equipment and a happy ending to the flight. This is an inspired hymn to the Party, which has developed such heroes, soviet scientists, designers, the entire Soviet nation, the first to penetrate space. As a result of the flight, Bykovskiy and Tereshkova obtained large amounts of factual material which will assist in further development and improvement of piloted space ship systems.

We open with excitement the first page of the flight log of the space flight record holder Bykovskiy. No one has ever spent a longer time in space -- 119 hours and 6 minutes, more than 81 orbits around the earth, more than 3,300,000 km through space -- this is his unsurpassed record. Clear, concise notes. A fine, close handwriting. It is obvious that he quickly adjusted to the situation and felt at home. Here is one of his first notations: "During the powered portion the G load was not unbearable. The most pleasant feeling was when the last stage ignited. A sharp drop in G's and, I would say, the unnoticed firing of the last stage. I even reported that I could not feel it firing. I feel wonderful ... pulse good (60). Respiration -- 8-10."

We open the log at another place. Here the notations are on observations of the earth below: "In France I saw an aircraft vapor trail. Excellent view. Ships are quite visible in the Mediterranean."

Here Bykovskiy accompanied the notation with an expressive drawing: two ships travelling one behind the other, and behind them, parting, a frothy wake. "I got a good view of Leningrad, the Suez Canal, the Nile and all of Egypt. I saw no smoke anywhere. Observed an excellent thunder storm."

A new page, new observations: "river visibility very good. I can see where the former bed was, dried up, and where there is water. Visibility of the seas is better than the ocean. There is a haze over the ocean almost constantly. The shoreline is clearly visible. I determine with it the regularity of the globe's movement. The Antarctic and Greenland icecaps are quite clearly visible. General orientation is excellent."

As is known, the cosmonauts not only made visual observations, but also took movies. Many movie frames were later published in the press and were incorporated into motion pictures. There is a notation about this in the flight log. During their flights, Titov, Nikolayev and Popovich observed tiny white particles following the space ship. Bykovskiy also focused his attention on this phenomenon. The following notation appeared in the flight log: "... when the ship emerges from the shadow and receives light to the left of me, in the right porthole I see moving bright dots 20-30 cm away and as far as 2 meters from the ship. Their movement is such that they seem to be travelling more slowly than the ship or that the ship is overtaking them. I observe this effect each time I emerge from the shadow. I always see them (particles). I must ask earth to give instructions to the Seagull to check the same phenomenon."

The flight log contains many notations on weightlessness. On earth, after the flight was over, Bykovskiy said that the state of weightlessness is an incomparable delight. Here is what he noted down in the log during the 18th orbit at 15 hours and 6 minutes: "Unstrapped myself. It is not difficult, even easier than on earth. You can do things at the speed you want, that is fast or slow, but one should not hurry. There are no unpleasant sensations. I did everything according to plan. Did everything very easily. Numerous variants of moving about the cabin are possible. There is much room. I floated for an entire orbit. I strapped myself down unhurriedly and easily. If there were ventilation in an unstrapped condition, one could spend as much time as he wanted."

Characteristic is the notation: "Lots of room." In Sao Paulo, Brazil, in one of the pavilions of the International Aviation and Space Exhibit, we were able to make a careful examination of the space capsule in which the American Walter Schirra made his first flight around the earth. Admirers thronged around it. Every visitor at the exhibit wanted not simply to look but to touch this space "shelter".

But our cosmonauts, Nikolayev and Popovich, were not pleased with the capsule. It was so tight and small that there was no possibility of floating in a free state. Nikolayev noted aptly at the time: "Yes, you can't take much of a walk in there." In the cabin of our "Vostok" there really is "lots of room". This is what Bykovskiy noted down in the 34th orbit at 16 hours 6 minutes: "I unstrapped myself in the effective zone of the television. I floated freely. Easily. Without difficulty. How charming it was to look through the portholes. The angle of vision becomes much larger. It is very difficult to determine spatial position. When the light is turned off it is difficult to become oriented. There is neither floor nor ceiling." Here is what was written in the 50th orbit at 1706 hours: "Every time I await that moment when I have to unstrap myself. It is very pleasant. In a free condition it is easy to reach any object and take moving pictures. What bliss to fly motionless in the air!"

Yes, we earthlings can only envy the blissful state of the cosmonaut when he is in weightlessness. However, the effect of weightlessness has not been completely determined, particularly for extended space flights. Here nature retains its secret. Through their flights, which have lasted many days, Soviet cosmonauts have furnished scientists with abundant material, which will help to lift the curtain even more from the mysterious effect of weightlessness on the human organism. As is known, the cosmonauts did not merely view the black, silent space, extending beyond the walls of their space ship, and they did not merely admire the breathtaking view of sunrise, the cold shine of the stars and moon. They worked. They did much work. They maintained constant contact with earth, informed each other by radio about the progress of the flight, exchanged data on shipboard equipment and system operations, as well as data obtained from earth. In addition, they took various vestibular and physiological tests. Here is one of the notations confirming this: "I am constantly working with the control panel. It is easy to work in any position."

From further notations jotted down by Bykovskiy it is obvious that the ship can easily be controlled, that it is obedient to the will of the cosmonaut. All the equipment worked without breaking down throughtout the almost five days and nights of the flight. This is great credit to our scientists, designers and workers, who have built the world's finest space shelters for the explorers of the universe.

On one of the pages of the flight log we find a curious notation. Bykovskiy told about this later, laughing, at a reception at Moscow university. He said over the radio: "I had stul /chair/." But on earth the last word was misunderstood and they took it to be "stuk" /knocking sound/. Immediately the questions flowed: "where is the knocking sound?", "what sort of a knocking?" This is what Bykovskiy wrote about it: "I used the ASU (stul)." And further on in capital letters: "NOT STUK. It is not difficult. Everything was just like during practice back on earth, even better." As we see, the scientists and designers thought through all details involving not only working conditions but also living conditions.

Thirty-eight hours passed after the "Vostok-5", piloted by Lt Col Bykovskiy, was launched into orbit. On 16 June a new ship, the "Vostok-6", went into orbit. This time the world's first woman cosmonaut, Tereshkova, bearing the tender spacename "Seagull", had been launched into space. On the television screens we saw her face, and were gladdened when she bestowed a beautiful smile upon us. Everything was AOK, and Valya felt wonderful. She became accustomed very rapidly to the unaccustomed situation and just as her "heavenly brother" did, immediately started working. I look over her notations in the flight log. A clear and sure hand, little differing from the handwriting she uses in taking lecture notes. Periods and commas were needed, and the sentences begin with a capital letter. Everything according to proper orthographic rules. A person who is nervous and worried about the outcome of the flight cannot write like that. Valya was not simply observing the world from the porthole. She was making notes on what she saw. "I felt fine during the powered portion of the flight. I was a little nervous. After separation of the last stage the transition to weightlessness was very smooth, and therefore there were no sharp fluctuations. Perhaps because I was engaged in making observations. Dust particles flew up upon separation ... no deviations noted in vestib. analys." Further on she says how she felt in weightlessness. "Condition in weightlessness: one feels light, ability to work is not lost, my mood was always good, particularly after talking with "Hawk". One feels good when one feels a friend's shoulder far away from everybody," she concluded. Just below there was a new notation, which is undoubtedly of interest to physiologists. "There were no unpleasant sensations after making the vestibular tests: neither dizziness nor nausea. I felt just as if I were on earth." Valya is an excellent athlete. She kept up her exercises in space. "Physical exercise," she writes, "has always given pleasure. In addition to the prescribed group, I added my own."

Later she returns again and again to this scene. During the 13th orbit, from 0546 hours to 0600 hours she once again did physical exercises and made the following notation: " I did the entire group. I perspired a little after doing them, but this passed quickly with ventilation. During the first and second days I did physical exercises, adhering to the flight schedule. On the third day, during my free time, I did more exercises, adding my own to the group, and I prepared for the descent." These notations once again show that regular physical exercise and athletics, special training sessions, including vestibular exercises, enabled Valya to get into proper shape, to stand immense gravity loads, particularly during the launching into orbit and during the descent. Tereshkova was in flight 71 hours. She completed 48 orbits, travelling about two million kilometers. The untrained organism simply could not take such a load.

She showed herself to be a thinking scientist and careful observer. Not one thing of interest to science escapes her gaze. For example, on one page of the log she drew a representation of the sun and the protuberances ejected into space. If this could have been done in colors, the majestic picture would have emerged. Unfortunately there were no coloring materials on board. Valya, just as Bykovskiy and the other cosmonauts, saw particles accompanying the ship during flight. She noticed the following: "At sunrise I observed in the right-hand viewport a mass of small particles. They floated by rapidly. A large quantity of tiny particles. I had the impression that I was passing through a meteorite layer." In a number of places Valya gives a rather detailed description of the vista opening up before her in space, a description with picturesque comparisons. "During the sixth orbit," she writes, " I saw a storm in the Indian Ocean. The sky was illuminated by bright flares. The night horizon was rather homogeneous, just as it is before dawn. Before sunset the sight is unforgettable. The clouds over the oceans are in banks, mostly strips with small breaks. I could not photograph the clouds along the route. I observed a bright strip over the horizon (6-8°) without the moon, since there was none. It was milky gray with a faint green haze (shots taken). I examined the surface of the ocean with the aid of the polaroid. Contrast increases greatly."

Valya was quite enthusiastic about the equipment and mentioned this in the flight log. She was the first woman, after all, to operate this marvelous space ship. "Ship under manual control turns readily in any given direction." "Radio communications were fine for three days and nights." "...the air conditioning system worked well throughout the flight." "... contact with "Hawk" was solid and constant. Reception was clear and good."

Summing up the first day of the flight, Valya made the following entry in the log: "The flight is proceeding normally, All systems operating well. Constant temperature and moisture conditions are being maintained in the cabin. Temperature 30° C, but by 1900 hours dropped to 25°." "The flight log and chart are placed conveniently. Everything is easy to use with the tumbler switches. The lighting is placed conveniently, it is good that they made a switch."

Such praise for the equipment does honor to our designers. They made sure that the cosmonaut cabin was comfortable in the full sense of the word. One notation was dated 1636 hours. "VSN-1 asks "Hawk" what songs you sang in duet? Why are you silent, Valerka?" This gives an impression that the conversation is not taking place in space but on a garden seat, where the heart waxes lyrical. It sounds so direct and familiar.

Valya's sense of the beautiful did not change in space. She is quite a music lover and during her free time likes to listen to familiar melodies. She noted down in the flight log: "No fantasy during the entire flight, never lost consciousness. Music reproduces itself very well during the time spent resting or meditating. One hears every chord, particularly the Tchaikovsky Piano Concerto." A measured rhythm of life was established on the Vostok-6, just as on the Vostok-5, during the extended flight: work, rest, sleep, and food at specific intervals. Valya writes: "I slept deeply, without waking once, and woke up in the 13th orbit while approaching Kamchatka. Excellent appetite." Several pages later, a new notation: "I always feel good after rest and sleep. I don't complain about sleep, since in addition to the prescribed rest, I took some even on the contact orbits. My appetite was good. On the morning of the third day I ate some little pies with sprats and an egg, and drank cherry juice and water." She did not like the pies much, to be true, but drank the juice and water with gusto. We reproduce various geometrical figures in one of the pictures, included with the article. These were done by Tereshkova in flight. These are so-called vestibular tests. Apparently the scientists have already drawn their conclusions about these drawings. But one thing is clear: Valya did not lose coordination of movement, and the hand holding the pencil was quite steady.

...years will pass. People will fly to the moon, Mars, Venus and other planets in the solar system. But they will always remember the deeds of those who first trod the space road to the universe. The laconic notations by our cosmonauts and the pictures taken by them will go into the history of mankind as testimony to the daring and courage of Soviet citizens, who did not lose their presence of mind during the first and most difficult space flights.

Caption to photo on page 3: Page from flight log of Lt Col Bykovskiy.

Caption to photo on page 4: Notations and drawings by Tereshkova in space.

10,284
CSO:1850-S

PHYSICS AND NEW WEAPONS

/Following is the translation of an article by Maj Gen Engr-Tech Serv I. Anureyev in the Russian-language newspaper Krasnaya Zvezda, 21 November 1963, pages 2-3./

Answering recently a question posed by a group of editors of military newspapers and journals, The USSR Defence Minister, Marshal of the Soviet Union Malinovskiy, noted the immense role played by constant and profound emphasis placed upon the most modern achievements of science and technology for strengthening the defensive might of our country. He emphasized that "due to the outstanding success in developing the Soviet economy, science and technology, in recent years we have seen a revolution in the military. Radical qualitative changes have affected all basic areas of military science: weapons, organization, combat techniques, methods of training and educating personnel." The readers of this newspaper have requested the editors to discuss the influence of the development of various areas of science and technology on the nature of modern warfare, to outline new, long-range developments in the military. Meeting this request, this newspaper will publish a series of articles under a new heading, "Science, Technology and Modern Warfare". Today we publish the first article in this series.

Scientific and technical progress has always had a decisive influence on the techniques of waging war and its very nature. But this role has never before been manifested so rapidly, all-embracing and with such consequences as in our days. Scientific achievements and discoveries have led to the creation of powerful means of waging war, which have changed long held views on the role played by various types of armed forces in warfare, and have compelled us to revise basic principles of tactics, operations and strategy.

What scientific achievements of our time have had such a decisive effect on military science? They include first of all the discovery of techniques of using nuclear energy, the development of missiles, mathematics and computer technology, electronics, automation, chemistry, metallurgy and instrument building. Of particular importance is the discovery of military applications for nuclear energy. This discovery became possible due to the achievements of modern physics, as a result of which a well balanced doctrine was worked out on the structure of the atom, radioactivity and isotopes, as well as artificial nuclear fission.

Let us take the following example. Elementary particles in an atomic nucleus move at exceedingly high velocities. For example, the velocity of alpha particles is 20,000 km per sec, and their kinetic energy is two hundred million times the energy of a gas molecule at room temperature. It is impossible to study the movement of particles with velocities comparable to the speed of light using the methods of classical mechanics. For these cases principles of the Theory of Relativity and Quantum Mechanics are applicable. A major law in the Theory of Relativity is the law of interrelation between mass and energy. It is essentially as follows: the energy contained by a body is equal to its mass in a state of rest, multiplied by the speed of light squared. Before this law was established we could use only infinitesimal fractions of intrinsic energy (thermal energy, the energy of chemical reactions). Achievements in the area of nuclear physics, and the development of Quantum Mechanics (the science of the laws of movement of elementary particles) have made it possible to discover and produce atomic energy. Practically inexhaustible reserves of energy have appeared on earth. As is known, imperialism utilized this outstanding achievement of physics primarily for military purposes, a fact which compelled the Soviet Union to create atomic weapons also. Atomic bombs based on the principle of the reaction of the fission of heavy nuclei of U235, 233 and Pu239 took their place in the arsenal of modern weapons.

Right after the reaction of fission, man obtained a reaction of synthesis of hydrogen isotopes -- deuterium and tritium with transformation of their nuclei into heavy helium nuclei. These reactions can take place at very high temperatures, in the order of ten to fifteen million degrees centigrade. These temperatures occur during nuclear processes on the sun and in the stars, as a result of which immense heat energy is produced. Thermonuclear reactions on earth are produced at present during the moment of a thermonuclear bomb detonation. Thus, another outstanding discovery in physics has led to the creation of an even more powerful mass annihilation weapon -- the thermonuclear bomb. Extremely powerful thermonuclear bombs have been created in this country with a TNT equivalent of 50 and even 100 megatons. They possess colossal destructive force and can cause heavy radioactive contamination over immense areas.

During World War II high explosive aerial bombs containing about half a ton of TNT were the most widespread form of heavy ammunition. If two hundred million of these bombs were placed in a pile and exploded, the shock wave would be the same as that occurring during the detonation of a modern 100 megaton thermonuclear bomb. However one should bear in mind that in the latter case a new and powerful destruction factor occurs -- penetrating radiation and radioactive contamination of the physical surroundings. The detonation of an average size thermonuclear bomb in a major industrial area with a high population density can lead to the deaths of one and one-half million persons, as has been noted in the press. Another five hundred thousand persons may die from the subsequent fatal effect of radioactive contamination. Calculations have appeared in the foreign press, showing that eight three to five megaton hydrogen bombs are sufficient to finish off West Germany. American scientist Pauling wrote the following: "About one billion persons live in the areas where major nuclear strikes probably will be made. Within 60 days from the moment of a nuclear attack, five hundred to seven hundred and fifty million persons may perish." It is difficult to say what Pauling based his calculations on, but if he is merely 50% right, even this attests to the immense destructive force of thermonuclear weapons.

Present-day armies now possess small-sized nuclear weapons, which radically changes the nature of warfare. As the USSR Defence Minister, Marshal of the Soviet Union Malinovskiy, noted, our Army now possesses a large assortment of nuclear weapons, beginning with small charges and ending with bombs of 50 megatons and more. The necessity for such weapons is dictated by the following circumstances. It is difficult to utilize high power nuclear charges on the battlefield. They destroy large areas, and it is impossible to use them under direct contact conditions with the enemy without the risk of destroying one's own troops. As noted in the foreign press, the USA has tested nuclear charges of a hundred tons of TNT and less. The effect of such a charge is 200 times weaker than the blast from the bomb dropped on Hiroshima by the Americans in 1945. What do these small nuclear weapons provide from a tactical standpoint? The shock wave from the blast of such a bomb causes only medium damage to brick buildings at a short distance. Luminous radiation may cause second degree burns, while penetrating radiation leads to radiation sickness, but not to a dangerous degree. Low-powered nuclear ammunition can be used even when troops are in direct contact with the enemy. Such weapons can destroy or hold down enemy support points and artillery emplacements. As a result of such strikes, gaps are formed in the enemy defences, which can be used by advancing forces to split up the enemy combat formations and penetrate to the rear. Combat takes on an exceptionally maneuverable and swift nature.

The achievements of nuclear physics have made it possible to obtain a controlled nuclear reaction. Various atomic power plants have been built on this principle. The military application of controlled nuclear reactions has led primarily to the building of atomic submarines, carriers of ballistic missiles with nuclear warheads. The use of atomic power units in foreign submarines has made it possible, as has been noted, to increase the speed of submarines to 50 km per hr. No air is required for the operation of atomic engines, and therefore submarines have become underwater ships in the full sense of the word. They can cruise for long periods of time without surfacing.

Foreign specialists believe that in the future we can expect the use of nuclear powered rockets, which will greatly improve their tactical and technical characteristics. Of great importance will be nuclear power units and nuclear power sources for space equipment of varying types. Nuclear weapons have become strategically important due to the creation of improved carriers -- rockets. Modern ballistic and global missiles are capable of delivering large nuclear warheads to any point on the globe. An ICBM requires only 25 to 30 minutes to cover a distance of, let us say, 10,000 km. It is hardly possible to escape such an attack. Soviet global missiles have completely eliminated the concept of geographical invulnerability. An attack by these missiles is unstoppable. The combination of nuclear warheads and missiles has determined the basic feature of future war as a missile and nuclear weapons war on a global scale.

Major discoveries and achivements in physics, utilized in building modern rockets include the profound elaboration of problems of aerodynamics, gas dynamics and rocket dynamics. At the present time these scientific areas are already independent, extremely complex and voluminous sciences with many branch areas. But basically they are all physical sciences. Their principles lie in mechanics, the section of physics dealing with the simplest of all forms of motion -- mechanical motion. Without the development of aerodynamics the building of modern military aircraft and winged rockets would be unthinkable. The development of jet aviation became possible due to the development of gas dynamics, which constitutes the basis of high velocity aerodynamics and the theory of jet engines. Its founder was the eminent Russian scientist, Academician S. A. Chaplygin, who as early as 1902 established the basic relationships for the movement of gases at high subsonic and supersonic velocities. The results of the achievements of gas dynamics have found direct practical application in building modern jet aircraft and rockets. The flight velocity of modern military aircraft is now two to three times the speed of sound, But, as has been determined, this is not a limit. A further increase in the speed of flight was caused by the appearance of a new branch of aerodynamics -- hypersonic aerodynamics. This science will enable us to study in detail the movement of gas at great supersonic velocities. The military application of hypersonic aerodynamics will apparently lead to the development of new aircraft and abroad they believe that these will be new and improved carriers for nuclear weapons, as well as powerful means of antiaircraft and antimissile defence. Flight by ballistic missiles and space vehicles at altitudes of 100 to 150 km, in extremely rarified atmosphere, has demanded a careful study of the laws of movement of flight equipment under conditions whereby gas molecules have a large free run distance, calculated in hundreds of meters and sometimes several kilometers. It is no wonder that right now both experimental and theoretical aerodynamics of extremely rarified gases are developing rapidly. This study will make it possible to take into account the parameters of movement of ballistic missiles during movement at the end of the powered part of the trajectory and in atmospheric reentry, and we will be able to study as well the laws governing the movements of orbital aircraft, assisting us in determining more precisely the maximum time of space vehicles in orbit.

When rockets and other vehicles move at high velocity through the atmosphere, even rarified atmosphere, extremely high temperatures result, which lead to extreme heating of the walls of the vehicle. The problem of "kinetic" heating is an extremely critical one in aviation and rocket technology. It is essential to find new materials and surfaces capable of withstanding high temperatures. A study of the movement of bodies at very high heating temperatures has shown that in the so-called borderline layer (a thin layer of air along the walls of a rocket or aircraft) electromagnetic phenomena occur, which must also be taken into consideration. A new branch of aerodynamics -- magnetohydrodynamics -- deals in the study of electromagnetic phenomena in the borderline layer.

Finally we come to rocket dynamics. The foundations were laid by the outstanding Russian scientist K. E. Tsiolkovskiy, in his outstanding work "Study of Space with Reaction Powered Vehicles" (1903). The great scientist established the basic laws of rocket movement and developed his famous formula for calculating the velocity of a multi-stage rocket, which even now is a "household" formula for any rocket specialist. As a result of the development of aerodynamics, rocket dynamics and other areas in physics, due to the use of the achievements of chemistry, electronics, metallurgy and instrument building, it has become possible to build military missiles which constitute at the present time a most important weapons system. Characteristic of this type of weapon is a high combat effectiveness throughout the entire striking range, from several dozen to several hundreds of kilometers. Tactical missiles are reliable in operation and do not require much time for launch preparation. They can carry nuclear warheads. This opens up great prospects for destroying any enemy target on the battlefield with a nuclear strike. Precision in guiding rockets is now so great that a missile travelling more than 12,000 km does not fall more than 1 km from the bullseye point.

In recent years physics has achieved much in the area of electricity and magnetism, the theory of the electromagnetic field, electromagnetic waves and other areas. This has led to independent sciences such as radiophysics and electronics. They have become the basis for modern achievements in the area of electronics, telemechanics, automation and computers, without which the development and use of modern combat equipment is inconceivable. The outstanding scientific achievement by the remarkable Russian scientist Popov, who discovered the principle of radio communications and the phenomenon of the reflection of electromagnetic waves, subsequent discoveries of physicists in the area of radar and ultrashortwave radio physics have led to the rapid incorporation of radio and electronic systems in the Army. They now form the basis of communications systems, night vision equipment, aircraft and rocket in-flight detection, winged and ballistic missile guidance, and they are used to create disturbances to counter enemy guidance systems. Radar has become particularly important in military science. It has become a major means of creating effective antiaircraft and anti-missile defences. Modern radar sets, as noted in the foreign press, can pick up a target (aircraft, missile) 5000 km away and more.

Great opportunities are opened up through achievements in the area of solid state physics and the physics of semiconductors. Communications equipment, radar and guidance equipment is becoming more and more reliable in operation and compact in size. Electronic semiconductor instruments are not sensitive to shock, vibrations and last five to ten times as long as equipment using conventional tubes. Equipment is becoming more convenient and much smaller in size. Armies are already using compact transistor radar sets, easily transportable by one or two men. Some radio transmitters can fit in a helmet.

But this is not all. The achievements of molecular electronics are making it possible to build equipment of truly microscopic size. It can be assembled on special thin films or on so-called solid diagrams. They are called "solid" because the entire layout of the instrument is hidden within a solid substance -- crystal.

We should like to discuss in brief a new area in physics -- quantum radio physics. Its successes are opening up prospects for obtaining electromagnetic oscillations of extremely high intensity in narrow beams. These instruments are called "laser" in foreign literature. According to data in the American press, these units can obtain an impulse up to one to three million watts. It has been calculated that radio transmitters operating with these units will be able to transmit simultaneously thousands of television programs and telephone conversations. Some foreign specialists are endeavoring to use quantum generators to create a new type of weapon -- a death ray, which would be capable of destroying men and machines.

We have examined the basic areas in which physics -- a science which is truly limitless in its potential -- influences modern military science. As can be seen, this influence is immense and undoubtedly will continue to grow constantly. The situation is parallel in other areas of modern science. This compels Soviet Armed Forces personnel to study comprehensively not only that type of equipment which they are handling, but also to master the principles of all scientific and technical knowledge connected with progress in military science. Extensive knowledge will help our Armed Forces personnnel in handling their role better as armed defenders of our nation. They will be able to carry out tasks connected with further strengthening the defensive might of our country more effectively.

10,284
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CONFERENCE ON PROGRAMMED TEACHING

/Following is the translation of an article originally entitled "Search for Algorithms" by Capt 3rd Rank I. Panov in the Russian-language newspaper Krasnaya Zvezda, 11 December 1963, page 3./

"Answer the question!" A bulb lit up under this sign on the student panel. It meant that we, who were sitting in the automated classroom, were being asked to formulate Ohm's Law and transmit our answer to the instructor with the assistance of the machine. It was quite easy to do this. It was not at all because the formula of this law remains firmly entrenched in one's memory from school days. The answer to any question on a topic is fed into the machine just as we dial a telephone number.

Major A. Karetnikov, who is at the instructor's console, is quite concerned. No wonder: today the audience is quite unusual. Group after group, participants at the scientific methods conference on programmed teaching visit the facilities. They are hair-splitting and even captious. Answer by telephone? Isn't it better to do it the old way -- call a student to the board and let him recite? No, it is not better. At least now all thirty students in the class answer a question simultaneously. You can give them different questions, and the answers will still come at the same time. Savings in time -- individual verification -- possibility of coding? A solid, multidigit number ...

For three days heated and detailed conversation went on at the Naval Electronics School imeni Popov on new teaching methods. Officers came to the conference from naval schools and from all fleets. Not simply the duty of politeness but great interest brought guests from schools in Moscow, Leningrad, Kiev, Minsk and Khar'kov. All agreed with the conclusion of the primary speaker, Prof Engr-Vice Adm M. Krupskiy -- it is time to take specific steps and specific steps are being taken to reorganize the teaching process and facilities for it: many advantages of programmed teaching are obvious; but only boldness, hard work and an unstinting search will guarantee genuine success to this new development. The discussion held at the conference was held under the banner of this search.

Presently the most widespread units are automatic checking units, and they made up the majority at the exhibit which was timed for the opening of the conference. Some were amazed at the ingenious designs, and others were won over by the simplicity. The inventors gave them their own names -- "OKM-25" and "KTU-20", "UKU" and "OMVO" ... Engr-Capt-Lt Karatyshkin demonstrated an automatic unit which can examine 20 candidates at once in the rules for wearing a boat under sail, calculating the inductivity of a component of an electronic block or, let us say, a section of English grammar. The automatic unit evaluates answers to five questions and can immediately determine D and C students. All this is done in a matter of minutes.

Why is it that the primary growth is in the family of verification machines? They facilitate and expand feed-back between class and teacher, and consequently increase student activity. Naturally this is the main thing. But one cannot help but see the fact that it is a rather simple thing to build such a unit. Another thing is more complicated -- the elaboration of perfected control principles. No wonder those persons at the conference expressed the apprehension that enthusiasm with verification units would become a one-sided solution to the problem.

Prof Engr-Col I. Freydzon, telling of the application of programmed cards together with cybernetic units, recalled how important it is not to allow the students to develop the habit of "thinking according to hard and fast patterns", in other words operating according to stereotypes. Docent Engr-Capt 1st Rnk N. Makagonov emphasized that the views of certain foreign authors are inacceptable to us. These authors recommend questionning periods after working with tiny doses of material. This leads to a loss of logical connections in the topic, which becomes essentially learning by rote and cramming. Many debates were caused by the form of questions and answers. They said that no and yes type answers no longer correspond to the achieved level of new teaching methods. Some persons cast doubt upon the widely used "alternative principle" in the machines, whereby the student is to select the correct answer from several prepared answers. Naturally it is better for the student himself from beginning to end to "build" the answer. But the following question arises: are present machines able to take such an answer, even an electronic machine of the "Ural" type? And if there is no "Ural" ? At the Higher Naval Engineering School imeni Dzerzhinskiy, a group of educators headed by B. Aleshin elaborated an original principle of building a teaching machine complex. This principle is called thermoelectro kinetic analogy, and it makes it possible to effect static and dynamic simulation of the most complicated processes. In practice it is as follows. A group of students making up a certain cruise watch, can complete a two hour cruise with extremely varied changes in the conditions of unit and systems operation. It has been established that this watch is no less complicated and tiring than an actual shipboard watch, while in its educational value it is sometimes superior. The heart of this training unit is a constant action electronic machine. In the same school, on the basis of a non-linear MN-7 simulating machine, a trainer-demonstrater was built, which recreates the maneuvering of a submarine in natural time intervals. In guiding his ship, the future officer not only "feels" his maneuver, but also sees it on a screen. When officers Shapovalov, Danishevskiy and Yeremenko reported on the use of this electronic equipment in school, a retort came: "and if there is no 'Ural' ?". The rejoinder was not absolutely groundless, but immediately another came. Unfortunately, the opinion has not yet been eradicated that programmed teaching is either tantamount to the use of machines or must begin with this.

Cybernetic machines make a great impression. They are shown to guests and senior officers, and they are written about in the newspapers and magazines. Some practical workers have their doubts: why do we need new methods, when we have so many electronic computers? However, the creation of many teaching units is within the reach of any group of efficiency innovators. But this is not the only point. Cases are already occurring whereby machines are standing around idle? Why? One of those present at the conference compared the situation with a construction site where cranes and excavators have already arrived, while the construction men do not yet know what they are going to build -- they have neither plan nor technique. Prof Eng-Capt 1st Rnk S. Berezin said the following: "the primary difficulty is not in building machines but in using them efficiently."

No wonder the conference discussed in detail the structure of programmed teaching and the sequence in incorporating it. According to the general opinion, this job should begin in school with determination of the scientifically justified amount of knowledge and skills which should be acquired by a person before graduation. On this basis a logical teaching pattern and algorithms are formulated, that is the procedure and sequence of studying a program as a whole and for each discipline separately. This determines the structure of teaching and methods aids, and correspondingly

-- the characteristics of the teaching machines.

Particularly laborious is the elaboration of logical course patterns. But it is also effective. Docent A. Sorokin said that at the School imeni Popov, in determining a logical outline for a course of study in descriptive geometry and mechanics they were able to "save" 20% of semester class time, that is one hour out of five. Where did the savings come from? Scholastic disciplines, just like units in an electronic machine, are connected in one single complex, each of which has input and output content. The input circuits are that which the students must know and be able to do to master a given subject. Newly acquired knowledge and skills can be called output circuits. This knowledge and these skills in turn serve as a basis for mastering the following one or several subjects. Programmed teaching requires precise fitting of each "unit". Parallelism and non-essential sections are always eliminated in the teaching schedule.

"It has become difficult for lazy persons". These words were contained in one of the reports. Programmed teaching is becoming at the same time individualized. It is a new factor in education. Already the application of the first automatic verifying units has lead to an increased responsibility in students for smooth functioning and quality of study. The elaboration of teaching algorithms and machines is calculated for extremely individual learning rates, corresponding to the potentials of a given person. "The strong student will not hinder the weak one, and the weak will not hold back the strong." Some wag has called the new system "a cybernetic tutor". There is no doubt about the fact that lazy people will have a tough time with such a tutor.

We shall not forecast in detail how outstanding an average student will feel working with the "tutor". This is a job for the psychologists and methods experts. Serious concern was expressed at the conference lest scientific research in the effectiveness of new teaching methods be conducted on too broad a front and with the participation of extremely diversified specialists. Here is the opinion of some of the conference participants: Prof S. Berezin. "The teaching potential of complex machines has not yet been fully determined. Constant contacts between colleges on the problems of programmed teaching have not been arranged. Moving pictures must be used more extensively: they facilitate the assimilation of the more complicated divisions of a science."

Prof I. Freydzon: "We have been living practically since Socrates in the traditions of rote learning. The reorganization requires scientific analysis. We need psychophysiological and logical mathematical studies of the new teaching methods."

Candidate of technical sciences M. Ugarov: "Teaching methods or, using other words, methods of information transmission should become optimum, and for this end it is time to substantiate them with such sciences as pedagogy, psychology and cybernetics."

Capt Lt Yu. Gashitskiy: "The Navy has long been using various types of training units, many of which are commercially produced. We must think about making cybernetic attachments for them, making it possible to apply new teaching methods."

Docent Ye. Chernykh: "A dilettante approach may ruin the new methods. It is about time to create groups of algorithm specialists, programmers, and machine designers, recruiting more extensively the members of the student scientific society."

Capt 1st Rnk P. Gonorskiy: "We must be more flexible in synthesizing and distributing locally all information on the theory and practice of programmed teaching. This is an important job for committees and commissions now being organized in departments. It would not be a bad idea to organize competition for teaching machines, series producing the prize winners."

Feed-back. Multiple choice. Process optimum. Algorithms. Up until quite recently these terms were familiar only to a narrow circle of specialists and enthusiastic proponents of the new developments. The time is coming when the new words and concepts will be just as commonplace in the commander's lexicon as the old favorites "demonstration", "discussion", "question period" ...

The hundreds of officers who participated in the conference had the opportunity to become convinced once again that programmed teaching is confidently emerging beyond the framework of experiment. Important attempts were made at the conference to determine the procedure, so to say, the algorithms of further search and study. This search is going on every day, and will continue...

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